WILLIAM MARTIN LEAKE.

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"PIONEERS OF THE PLANTING ENTERPRISE IN CEYLON."

(Second Series.)

MR. W. MARTIN LEAKE,

ENGINEER, PLANTER AND MERCHANT:—1859—1873.

IT is much more difficult to deal with the careers of "pioneers" and "public men" who are still in the land of the living, than with those who have already passed that "bourne whence no traveller returns." And this is especially true when the subject of our notice is a personal friend, and an ex-Colonist so very generally liked and esteemed as is Mr. William Martin Leake, the well-known Secretary of the Ceylon Association in London. But apart from the fact that Mr. Martin Leake's career has been nearly all contemporary with our own—and open before us as that of a public man, almost from first to last—we have had the great advantage of securing "notes" of that portion of his life of which we could know nothing, written, though reluctantly, at our earnest request.

We trust the use made of this information in the story of the varied career of a Ceylon Colonist of a past generation will tend to the benefit of his successors in the present day. It is something to bring before young Colonists of the present day the career of a man of culture and high professional training, who, nevertheless, entered on the ordinary and sometimes rough work of the pioneer—at least as Engineer—with the utmost zeal and pluck, and whose further experience as a Merchant, Planter and Public Man Ceylon was uniformly marked by transparent honesty, straightforward devotion to duty and no small degree of self-denying interest in the welfare of subordinates and young employes. Mr. Martin Leake's work as Secretary to the Planters' Association (and for a term as Chairman and M.L.C.) alone entitled him to the gratitude of his brother Colonists, a gratitude which is still further enhanced by the continued good work for the Colony he is discharging as the Secretary of the Ceylon Association in London. But we must not plunge into the middle of our subject. We cannot better begin than by giving the following concise "chronology" for ready reference in regard to the, happily, still unfinished career of Mr. Leake:—

1831.—Born in Montagu Street, Bryanstone Square, on 23rd April, St. George's Day. [Birthday of one W. Shakespeare.]

1836.—Went to a Boarding School in Bayswater Village, kept by a lady.

1837-40.—At school at a day school in Upper Baker Street.

1840-45.—At the New Proprietary School, Blackheath.

1845-50.—At Rugby.

1850-54.—At St. John's College, Cambridge.

1855.—Travelling in Italy, Sicily, Austria, Germany and France.

1856-58.—Apprenticed to J. M. Rendel, C.E., President of the Inst. C. E. On his death at end of 1856, served out time with his executors—his sons Messrs. M. & G. Rendel, (former of whom is now Sir A. M. Rendel, K.C.I.E.) and Mr. W. G. Armstrong of Elswick (now Lord Armstrong). These years were divided between official work in Great George Street, Portland Breakwater (the late Sir J. Coode was in charge there), Shadwell Basin, London Docks, and the Elswick Works.

1858-59.—Assistant Engineer at the new Dock, Leith, under G. Robertson, F.R.S.E., who afterwards reported on the Harbours of India, visiting Ceylon in 1872.

Oct. 1859.—Sailed for Ceylon to join G. D. B. Harrison, then carrying out Irrigation works in Southern Province.

1860-61.—In Ceylon in Southern Province—Kirime, Tissamaharama, and Baddegama.

Oct. 1861 to June 1862—At home. Married 6th Nov., 1862, at Galle, Louisa, youngest daughter of Sir James Tennent, K.C.B.*

1862-1873.—Partner in Keir, Dundas & Co.—1869 and 1870 were spent in England—in 1870 made a tour in Russia, St. Petersburg, Moscow, Nijni Novgorod, and Odessa, to promote direct coffee trade through Suez Canal then just open.

1873.—Left Ceylon.

1874-1896.—Started Tunnel Portland Cement Works Co. and is still managing it.

In the case of Mr. Martin Leake we are able to begin at the beginning with an explanation as to the origin of the

FAMILY NAME.

This double name, we find, dates from the beginning of 18th century. In the time of William and Mary and Queen Anne there were in the Royal Navy two officers of distinction, Admiral Sir John Leake and Capt. Stephen Martin, who married two sisters named Hill. On the death of the former in 1719, without living issue, he left to his old shipmate all his lands and money, value some £30,000, on condition that the latter assumed the name of Leake. By letters-patent of George I., dated December, 1721, Capt. Stephen Martin accordingly became Capt. Stephen Martin Leake. These two old naval worthies have not, like the many brave men before Agamemnon, perished unknown. The "vates sacer" has been found in Stephen Martin Leake, Garter King-at-Arms, son of Capt. Stephen Martin, who compiled from original documents a full and detailed Memoir both of his father and also of Admiral Sir John Leake. The latter he published himself in 1750, and the book though scarce is still obtainable. The Memoir of Capt. Stephen Martin was published so lately as 1895 by the Navy Records Society, Sir Clements Markham being the editor. The grandson of the Garter King-at-Arms referred to above was Stephen Ralph Martin Leake of the Treasury—who, in 1831, when his youngest son William was born, was official Private Secretary to Lord Grey, then Prime Minister. The

SCHOOL-DAYS

of young William Martin Leake began early, owing to a prolonged absence in Ireland, on Government business, of his parents. His first school was in the then little country village of Bayswater. From his house in Nottingham Place, Regent's Park, William Leake can remember walking across fields where now are Westbourne Terrace, Lancaster Gate, &c., to the school situated in the present Queen's Road. The Great Western Station at Paddington was then in course of construction, and Master Leake was next removed to Blackheath to a Naval Proprietary School which was started sometime in the "thirties" in opposition to an existing old Proprietary School which is to this day a flourishing institution. One of its chief promoters was Mr. Meadows White, Solicitor, grandfather of the gentleman now or lately Private Secretary to the Chief Justice of Ceylon. For the better edification of the pupil mind, a concrete structure after the model of the Parthenon was erected and divided into class-rooms. The school flourished for a few years, but soon languished. It must have been closed and the Greek temple pulled down some 40 years ago. But recollections of it have been lately stimulated by Sir Stuart Knill, who, during his recent mayoralty, gave a dinner to all such of his schoolfellows there as he could find. Forty-two old boys met that evening at the Mansion House, all probably over 60 years of age, most meeting after a separation of about half-a-century, a unique gathering. Three Messrs. White, sons of the Mr. Meadows White above-mentioned, were present.

Next we have young Mr. Martin Leake at

RUGBY.

In 1845 Dr. Tait, after an exciting contest with Dr. Wordsworth, had comparatively recently succeeded to the headmastership on the death of Dr. Arnold. Arthur Stanley's life of Arnold had just been published, and Rugby was steeped in Arnoldism. Mr. Leake went to the house of Mr. Bonamy Price, afterwards Professor of Political Economy at Oxford. To the same house at the same date, from the old Proprietary School, Blackheath, came G. S. Goschen, now First Lord of the Admiralty, also (though not from Blackheath) William Palliser, brother (it is believed) of the Pallisers of Radella, famous afterwards for chilled shot and big guns. Even in his schooldays young Palliser used to have an illicit gun.

In 1849-50 Mr. Goschen became head of the school. In the upper forms all lessons were learned out of school in the home studies, generally two or three preparing the work together.* For the last two to three years, in the Sixth Form, Mr. Martin Leake was thus associated in daily intercourse with the future Cabinet Minister. Another Rugby contemporary, afterwards well-known as a Ceylon planter, was the late Mr. William Greenwood of Gona Adika and Wattekelle.

Now we come to Mr. Martin Leake's

UNIVERSITY DAYS.

Among contemporaries at St. John's, Cambridge, were Mr. Leonard Courtney and Sir John Gorst. Mr. R. (afterwards Sir R.) Cayley came up in 1851, and in the Lent Term Races of 1852 steered the "Lady Margaret" second boat, in which Mr. Martin Leake was rowing. The boat was fifth on the river, and in the vain hope of maintaining that high place—vain because the boat lost one or two places—the crew was kept in pretty strict training. The constant association during these weeks of training was the beginning of the life-long friendship between the then coxswain and oarsman "Dick" Cayley, always so called to distinguish him from his elder brother Edward who was in the year above, and afterwards steered the "Lady Margaret" first boat, as head of the river in 1854 and had a great reputation as a judge of good rowing. In October, 1850, when Mr. Martin Leake went up, Mr. Arthur Gordon (now Lord Stanmore) was still an active member of the Union. Other leading speakers were William Vernon Harcourt and James Fitzjames Stephen. Later, Leslie Stephen, James Payn, and H. Montagu Butler come to the mind as leading lights. Mr. W. Martin Leake was a scholar of St. John's, and in 1854

* Sir James Tennent of the Bengal Artillery, made K.C.B. for distinguished services in the Sikh Wars. W. M. L. has nine surviving children.

* See life of Bishop T. V. French of Lahore, Vol. I., pp. 5 to 7.

was 29th Wrangler and in the second class in the Classical Tripos.*

CRICKET,

both at school and in college, received from Mr. Martin Leake, much time and attention. Blackheath in the "forties" was a very nursery of cricket. Kent with Fuller Pilch, N. Felix, the brothers Mynn, Wenman, &c., as its champions, had played the rest of England on equal terms year after year at Lords and Canterbury; and Blackheath and its schoolboys—especially those who were at the school kept by Mr. Wanostrocht (that was the true name of the great Felix)—felt as if they shared in the glory of the country. Enthusiasm thus engendered at school was for Mr. Martin Leake further stirred by the proximity of his home to "Lords," where at a very early age he used to see and criticize all the leading players of the

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* Mr. Leake has favoured us with the following notice of "Rugby" and "Cambridge" in his day, which is well worth reproducing:—

Rugby 50 years ago was thoroughly penetrated with the spirit of Arnold. Though the great headmaster had in 1845, when W. M. Leake went there, been for three years dead, and his mantle had thereon fallen on Dr. Tait, the future Archbishop; the staff of masters were nearly all Arnold's men who had been appointed by and worked with him during the stirring years of his headmastership. Further, the recent publication of his life and correspondence by Arthur Stanley had made more widely known than was possible during his life-time the nature of his work at the great midland Public School. Dean Bradley (Westminster), Prof. J. C. Shairp (St. Andrews), Prof. T. S. Evans (Durham), Canon C. Evans were also masters of Rugby between 1845-50.

Chief among the assistant masters at that date were Bonamy Price, afterwards Professor of Political Economy at Oxford, and George Edward Lynch Cotton, afterwards headmaster of Marlborough and Bishop of Calcutta, the "young master" of Tom Brown's school days. These two taught respectively "The Twenty" and "The Fifth," the two forms next below the Sixth. Never probably have boys had a more lively teacher than Bonamy Price, "an alert and stimulating man" as the writer of an obituary notice styled him. "In the Twenty," Price put on the spur and kept us up to our best. He was an excellent master whom we all thoroughly liked and appreciated, all the more perhaps on account of his "lively eccentricities," so writes the Very Rev. G. P. Pownall in his contribution to the Memoir of Bishop French of Lahore. Cotton, though quieter and colder in manner, was also a very efficient teacher. The two had this in common, that they were at their very best in lecturing on the New Testament, in *Exegesis* as Price loved to call it.

Another notable master, who had a lower Form, was Richard Congreve, the disciple of Comte, who afterwards was, at it were, the High Priest of Positivism in England. He it was who in 1848, when the thrones of Europe were reeling under the strokes of the all-pervading Revolution, stirred the fags of the school to rise and throw off the thraldom of the Preposters of the Sixth Form. Excited meetings were held in the Quad at which fiery harangues were delivered, but all in vain. The Sixth proved themselves too strong for their more numerous foes, backed though they were by a Radical master.

It was to Bonamy Price's house that W. M. Leake went in the summer of 1845. He had the fortune at once to be chosen as a fag by George Lawrence, then head of the House, afterwards well known as the author of "Guy Livingstone," "Sword and Gown," and other novels. Strange as it may seem to those who know him only by his books, there can be little doubt that Lawrence was himself the original of his own heroes. Life in his eyes was not worth living unless as a series of thrilling incidents; he had no wish to live beyond the age of thirty, he would say, and meanwhile he would thoroughly run through every excitement that life can offer. He has now long been dead, though he lived for several years beyond the limit of his own naming.

Among those who came to Price's house in that same summer were George Joachim Goschen, now First Lord of the Admiralty (like W. M. Leake he came from Blackheath, but from the rival Old Proprietary School) and William Palliser, brother of the Pallisers of Radella, afterwards knighted for his inventions in connection with Big Guns and Chilled Shot. Even in his school-days Palliser shewed his leaning for firearms, for he managed to secrete an old shot-gun in his study, which had the reputation of shooting round the corner, but none the less on occasion it would provide its owner with a stray pheasant, partridge, hare or rabbit, a savoury addition to the somewhat meagre school-fare of those days.

W. M. Leake did not remain long a fag, was moved quickly up through the various Forms, arriving safely in the desired haven of the Sixth Form in January 1848. In the upper Forms all lessons were prepared out of school, in the house studies, two or three preparing the work together. Mention is made of this custom in the sketch of Rugby in the Memoir of Bishop French already referred to. In that case Pownall, the writer of the sketch, was associated in this way with French, the future Bishop, and Cross, now Lord Cross. The companions of W. M. Leake, in lesson-learning during the years 1848-50 were G. J. Goschen and J. P. Beck, the latter, the eldest son of the late Mr. S. A. Beck, Chairman of the Gaslight & Coke Co. from whom that hive of industry, the Beckton Gasworks, takes its name. This system, giving life as it does to what is apt to be, when done alone, a work of deadly darkness, is an admirable one. Learning lessons under it became one of the most lively and sociable parts of the day.

In 1849-50 Goschen became Head of the School; and the year of his Headship is marked in the annals of Rugby by the departure of Dr. Tait, whose health had for some time been very indifferent, on his appointment to the less onerous post of Dean of Carlisle. This was probably the first occasion on which the future Cabinet Minister had a genuine opportunity for showing his powers of speech. Few masters can have had a more touching leave-taking than Dr. Tait on this occasion. The boys dragged him down to the Railway Station in his carriage, and the last scene in the stationyard dwells to this day in the memory of the survivors of those present. For the last few months of the school career of those who were leaving in 1850, the school was presided over by that excellent man Dr. Goulburn, but good as he was he was never meant by nature for a schoolmaster.

On looking back to the Rugby of those days, one of the most striking features is the number of distinguished schoolmasters sent out by the old school to propagate the Arnold tradition through the length and breadth of the land. Already in 1845 Dr. Vaughan, one of Arnold's pupils, was presiding over Harrow. Dr. Bradley, now Dean of Westminster, also a pupil of Arnold's and a master at Rugby in W. M. Leake's time, succeeded Dr. Cotton as headmaster of Marlborough on the appointment of the latter as Bishop of Calcutta. Mr. A. G. Butler and Dr. T. W. Jex Blake, both contemporaries and friends of W. M. Leake, became headmasters respectively of Haileybury and Cheltenham, the former being succeeded in his post by Dr. E. H. Bradley, head boy at Rugby in 1845, the latter succeeding in his Mr. H. Highton who had been both pupil and master at Rugby in Arnold's time. Dr. Jex Blake, alone among the Headmasters of Rugby of the last 70 years, was himself a Rugby boy. Further, Mr. Charles Evans (now Canon Evans) and Dr. Percival (now Bishop of Hereford) and the late Dr. Benson (Archbishop of Canterbury) all Rugby masters in the early "fifties" presided over Birmingham, Clifton, and Wellington respectively. To these who all became headmasters might be added the names of efficient assistant masters too numerous to mention. In the case of Arnold it cannot be said that the good he did was "interred with his bones."

(Continued next page.)

day. Going to Rugby, Mr. Martin Leake had the advantage in his later years there of the instruction of old William Lillywhite and his son Jack. "Old Lilly," as he was called, was the inventor of round-arm bowling, all bowlers before his time having delivered the ball underhand; and for a time so destructive was the new style of bowling, that a rule was made that in delivering the ball the hand must not be raised above the shoulder. Bowling under this limitation "Old Lilly" succeeded by close and prolonged practice in acquiring an accuracy of pitch

(Continued.)

In October, 1850, W. M. Leake went up to St. John's College, Cambridge, while his friends, Messrs. Beck and Goschen, at the same date betook themselves to Oriel College, Oxford, where they both carried off high honours, their names appearing in 1854 in the First Class in *Literis Humanioribus* in the same list. Oriel men had not for some years previously shone in the schools, and so delighted was the Collee at this unwonted double success, that a great feast gwas made to celebrate the event, whereat a silver punch-bowl that graced the board was presented to the two brilliant students. Both could not hold this memento of their College days, so by the toss of a coin it was decided that it should become the property of Mr. Beck. On his death, however, it was transferred to the hands of Mr. Goschen, to be handed down doubtless as a treasured heirloom to his successors.

The changes effected in Cambridge in the past half century, though very striking both to the outward eye and also in the inner life, are probably hardly so great as those in the great Public Schools. In 1850 the studies of the University were almost confined to Mathematics and Classics, Mathematics still taking the precedence, as, for H nours a certain modicum thereof was still indispensable. Cases still occurred of brilliant scholars being debarred, as was Lord Macaulay, from their due place in the Classical list owing to their failure in Mathematics. As with the studies, so with the athletics. These were confined to Cricket and Rowing. There was, it is true, one Tennis Court and one open Racket Court, but the players at these games were perforce very few. Football, Lawn Tennis, the Rifle Corps, the Athletic Sports, all now so popular, were things as yet unknown. The majority of reading men had to satisfy themselves with a constitutional of a couple of hours along the Trumpington road or elsewhere.

In the interval there have sprung up on the one hand well-equipped Laboratories, Technical Schools and Workshops; on the other Football Grounds, Tennis and Racquet Courts, Running Tracks, &c., Rifle Ranges. Another case in point is the Union: in 1850 the whole establishment was contained in one small room in Green Street, formerly a chapel, with a gallery round, lined with shelves whereon the books were kept; "a very one-horse affair" so said James Payn recently when writing on the subject in "Our Note Book" in the *Illustrated News*. Now how changed is all this! The present noble range of buildings with its spacious hall for debate, its library, reading room, writing room, smoking room, &c., affords to the members all the conveniences of a West End Club.

Another change noticeable by the undergraduate of the mid-century revisiting today his old University is in the style of dress. Top hats and black coats, which, in 1850, were the everyday non-academical costume, are now not to be seen. Light-coloured coats, straw hats, and caps are worn by all; no kind of free and easy garment is considered *infra dig.* To note the difference let any one, after a stay in the Cambridge of today, glance at Cuthbert Bede's pictures in "The Adventures of Mr. Verdant Green,". book first published about 1850. Even Mr. Charles Larkyns and little Mr. Bouncer, the lively young gentlemen who took in hand Mr. Green on his arrival in Oxford as a Freshman, are depicted as riding and driving arrayed in tall hats, while Verdant himself is to be seen sculling on the river in the same headgear, that probably has never been excelled: not bowling very fast, but keeping always on the wicket and varying the pitch at will he was an ideal practice bowler, while his son Jack, also a fair bowler, was besides a dashing batsman who could teach the young player by example no less than by precept. For three years Mr. W. Martin Leake played in the Rugby School Eleven, and on going up to Cambridge at once found a place in the University team. For the four years (1851 to 1854) he played in every match in which the University was engaged. In each of these years he played against Oxford at Lords. In the first year, 1851, when Cambridge won in one innings he had the fortune to make 66, the biggest score made in the match by any Cantab up to that date. In 1827, the first match of the series, an Oxonian made 71, but up to 1851 there was no other instance of a score over 60. Things are different in these days of centuries. The reasons are, no doubt:—(1) The better condition of the grounds. The wickets at Lords in the early "fifties" would not be tolerated today by any fairly good country club. Playing against fast bowling, even at Lords, was then a service of real danger. The improvement in the grounds it was that later brought about the abolition of the rule forbidding the raising the hand in bowling. (2) The system of boundaries which saves the breath of the batsman. In 1851 Mr. W. Martin Leake had to run out every hit, and in the innings mentioned at Lords was run out trying a fifth run. Boundaries, now rendered necessary by the attending crowds of spectators, had no place at a time when, even at the most important matches, a single row of movable benches gave full accommodation to all-comers. The thin line of spectators jumped from their seats to let the ball and fielder pass and repass. During the present season it has often been remarked, when Mr. Jessop has been driving ball after ball at almost lightning pace to the boundary, how inadequate is an allowance of 4 runs for such mighty strokes. The comment is just only on the surface. Had Mr. Jessop been obliged to run out each hit, as of old, he might indeed have converted many of his fours into fives, sixes, or even sevens. But how about the next stroke? Under the present system he has been able to score a second and may be a third four without running a foot in a shorter time than would have been needed for running out the first big hit. To score at the rate of two or three runs a minute, as Mr. Jessop has often been doing, and to continue the performance for half an hour and more, would, without boundaries, be a superhuman task.

To return from this digression. When Mr. W. Martin Leake went to live in Kandy in 1862,

CRICKET WAS LITTLE PLAYED UPCOUNTRY:

he lost no opportunity of encouraging the game. Organizing an eleven from among the Superintendents in his Firm's employment, he challenged the rest of the planters, and for several years this match was the occasion of a pleasant gathering in Kandy. On the opening of the Railway to Kandy in 1867, Colombo was promptly invited to bring up a team to play Upcountry. This, the first of very many succeeding contests, was a most exciting game, the visitors being defeated only by five or six runs. With Mr. T. E. B. Skinner, then Fiscal for the Central Province, Mr. W. Martin Leake about the same date started the Kandy A.B.C. (Athletics, Boating, Cricket) Club which, with the addition of one

more letter (D), lived for a space of well-nigh thirty years, and came to its end only last year.

After Cambridge, Mr. Martin Leake made

A TOUR ABROAD.

The Crimean winter was spent in Rome. There he met the late Mr. A. H. Baillie who was travelling with his mother and sisters. Early in 1855 Mr. A. H. Baillie returned home to go out to Ceylon, where, subsequently, he and Mr. W. M. Leake were on very friendly terms as Proprietor and Agent. Messrs. Lightfoot and Benson, afterwards Bishop and Archbishop, were there also. Mr. Leake had known them at Cambridge; and with Mr. Benson, as being then a young Rugby master, there was a connecting link. Mr. Martin Leake belonged to the Artists' Club for the winter; there he met Mr. Leighton just about to exhibit at the Royal Academy his first picture, the "Procession in the Streets of Florence," about which all Rome was talking. With three others he walked through the length of the Volscian Hills from Albano on to the rail at Capna, saw no brigands though warned to expect them—people all very kind and civil. From Rome Mr. Leake went to Naples, saw a fine eruption of Vesuvius, to Sicily (ascended Etna), to Leghorn, Florence, Bologna, Padua, Venice, thence to Trieste, Vienna, Salzburg and the Tyrol, Munich, Prague, Dresden, Berlin, Hamburg and home.

Next we come to Mr. Leake's

APPRENTICESHIP AS ENGINEER.

An interesting item, as bearing on present controversies is the expenditure by London Dock Company in 1855-59 on construction of Shadwell Basin. To make this comparatively small area of Dock the Company spent about £1,000,000 sterling, half the sum being expended in buying up and pulling down streets of houses. The Dock Company's shares fell under this expenditure from par to below 60, and have never risen again. Simultaneously the present Victoria Dock, just below Blackwall, was being made, G. P. Bidder being Engineer, by an independent Company on the Essex marshes where land was still cheap, and the London Dock subsequently bought up this much larger and more convenient Dock in self-defence, adding to it in 1878 and 1879 the Royal Albert Dock, the largest Dock of all. Sir A. M. Rendel is still Engineer to the London Dock Company as his father was 40 years ago. It was at Shadwell, in 1856, that Mr. W. Martin Leake first met his old friend and once partner, Mr. G. D. B. Harrison. Early in 1857 Mr. G. D. B. Harrison went out to Ceylon as one of Capt. Moorsom's staff for the Ceylon Railway.

At ELSWICK Mr. W. M. Leake saw the *second* Armstrong Gun made. This gun was taken to Woolwich to practise against the Royal Artillery. Its performance was such as to make absolutely necessary an immediate and complete revolution in big guns. It will be remembered that Mr. Armstrong was put in charge of the Woolwich Arsenal and given a free hand to the great discontent of Whitworth. Such a weapon as the Armstrong gun of that date, the bore with 40 spiral grooves and a shot with lead lining, has long disappeared from the scene.

LEITH.—One of the pleasantest years was spent in Edinburgh in August 1858 to August 1859. Unbounded hospitality awaited the Southron, especially one who was able and willing to play cricket, rackets and to row. The late Lawrence Mercer, once Manager of the Ceylon Co., Ltd., was then Secretary of the St. Andrew's Boat Club, and there was a lively time generally. G. Robertson, the Resident Engineer of Leith Docks, was eldest son of Lord Benholm, one of the Judges, so the Assistant Engineer did not want for introductions.

In 1859, while at Leith, Mr. W. Martin Leake received an invitation from his old fellow-pupil, Mr. G. D. B. Harrison,

TO JOIN HIM IN CEYLON

where, Sir H. Ward being Governor, money was being freely spent by the Government on Irrigation Works, &c. The offer, seeming to be a promising one as regards prospects, was accepted, and in October of that year Mr. W. Martin Leake sailed from Southampton for Galle. Alas! for the future prospects—by the middle of 1860 Sir H. Ward left Ceylon for Madras, and Sir C. MacCarthy came out with orders to stop all expenditure that could be dispensed with, and then at once set in the period of "parsimony" so ably reduced to practice by that most economising and worthy of public officers, Mr. William Charles Gibson, who had succeeded the new Governor as Colonial Secretary. The young Irrigation Contractors were plainly told that they need look for no more work; and there was nothing for it but to wind up, realize profits, and look elsewhere for occupation. So ended the short-lived firm of Messrs. Harrison and Leake.

One evening in the latter half of 1860 and 1861 Mr. G. D. B. Harrison and Mr. W. M. Leake, dining at the Galle Face Hotel, Colombo, met Mr. John Anderson and family on their way to Galle homeward-bound, Mr. J. Anderson having been ordered home for health's sake with injunctions never to return. This sudden departure had, it seemed, quite upset the plans of his uncle, Mr. John Gavin, whom he was to have joined as partner in the Firm of Keir, Dundas & Co. Mr. Simon Keir had already arranged to retire from that Firm, and Mr. G. H. Dundas, who was at home, was anxious to retire if some one could be found to take his place, so that Mr. Gavin was likely to become the sole survivor of the three old partners. Negotiations were at once opened with Mr. Gavin which resulted in a very few days in Mr. G. D. B. Harrison taking an active share in the work of the Firm, while Mr. W. M. Leake went home for a few months' holiday. The upshot was that on 1st July, 1862, Mr. G. H. Dundas retired from, and Mr. G. D. B. Harrison and Mr. W. M. Leake were admitted as partners into, the Firm of

KEIR, DUNDAS & CO., KANDY.

A few words on the vicissitudes of fortune of the once famous Coffee Firm may be interesting, and perhaps useful as a warning, in the present days of unclouded prosperity in Tea. Probably no Ceylon Firm has ever had a brighter time than Messrs. Keir, Dundas & Co. enjoyed during the ten years, 1854-64. In the former year its dealings were on a humble scale; in the latter all three partners had retired on handsome fortunes leaving to their successors a well-secured and apparently most valuable agency business. In 1864-66 came a time of trouble enough to try to the utmost the strength of the Firm. First, the failure in Colombo of Messrs. Wilson, Ritchie & Co., with whom many joint ventures existed, involved considerable liabilities; then in quick succession in London of two houses, Charles Joyce & Co. and Kelson, Tritton & Co., to whom sums were due; and lastly, several natives to whom advances had been made, succumbed in the general financial disturbance that accompanied the close of the American Civil War, and culmi-

nated in the Black Monday in May, 1866, when the city of London was a scene of panic such as has not since been witnessed.

Many of the properties on which the Firm had claims were owing to these failures thrown on a market where there were no buyers; and the position involved this dilemma, either serious losses must be faced or money must be found to buy in the properties in question, on which in most cases there were prior charges. The latter alternative was adopted, and before the end of 1866 the Firm, which had hitherto been mainly an Agency business, became sole owners of the Uplands and St. Sebastian Mills in Colombo, as well as the largest Coffee Estate Proprietors in the Island, the properties being necessarily subject to a somewhat heavy, though by no means as far could then be seen, crushing debt. Simultaneously the course of events had thrown into the hands of the Firm the valuable shipping business which had hitherto been transacted by Messrs. Wilson, Ritchie & Co. The crop of 1866-67 was a right good one, and so far all seemed to augur well for the new ventures of the Firm.

The sequel, however, may be best told by a few figures, shewing the

ANNUAL COFFEE CROPS

from that date of the estates owned by Keir, Dundas & Co., results arrived at, sad to say, in spite of consistently careful and liberal management.

	cwt.	
1866-67	36,135	average 1st four years 32,170 cwt.
67-68	32,561	
68-69	29,268	
69-70	30,717	
70-71	24,155	average 2nd do 17,996 cwt.
71-72	14,018	
72-73	21,215	
73 74 estimate	12,600	

In face of such results the game was manifestly a hopeless one in regard to the ultimate liquidation of the debt. The partners placed themselves in the hands of their chief London supporters, to whom after many months of anxious deliberation the whole business was transferred, both assets and liabilities, in return for a small cash payment. Mr. W. M. Leake returned home in September 1873. He remembers calling to say "goodbye to the Editor of the *Observer*" with the above figures in his pocket. The Editor (he tells us he saw Mr. John Ferguson and adds) "was then eagerly advocating the extension of the Railway to Haputale, using freely as an argument in its favour the probable increase of coffee crops." Mr. Leake on introducing his view that crops had hitherto only been maintained by the rapid increase of new land coming into bearing met with so little encouragement that he did not disclose the figures on which he relied, but contented himself with wishing the Editor good luck in his crusade! *—[See further on as well as in note for Editor's justification.]

Needless here to dwell on the oft-told tale of the part taken by Mr. Martin Leake's Firm in introducing the cultivation of

CINCHONA AND TEA.

It is not so well known that a venture was made in

CARDAMOMS

in 1871 or 1872 on the suggestion of Major Taylor, a Wynaad planter, who came on a visit to Ceylon about that time full of the success of experiments recently made in South India. A beginning of this cultivation was made in Rangala, in the jungle between old Tunisgalla and Girindi Ella; and though at first the plants did not come on and the experiment seemed to be a failure, after some years of practical abandonment, they were found to be doing well and good crops were obtained. The cultivation has been continued and extended in certain localities in the neighbourhood with varying success up to the present time.

We have already referred to the part taken by Mr. Martin Leake in

PUBLIC AFFAIRS,

but we may add that from February 1863 to 1868 he was Secretary to the Planters' Association, in 1872-73 Chairman of the Planters' Association and M.L.C.; 1877 onwards London Agent of Planters' Association; 1888-97 Secretary Ceylon Association in London,—a prolonged record of connection with Ceylon planting, extending already over more than 34 years. As to details of work done are they not all written in Planters' Association proceedings and the pages of the *Ceylon Observer*?

No sooner had Messrs. G. D. B. Harrison and W. M. Leake retired from Keir, Dundas & Co., than a singular change came over the fortunes of

COFFEE.

The price rapidly rose 50 %, and many accounts, the position of which had seemed hopeless, were in the course of a few months restored to vigorous life. A notable instance was the account of the late Mr. G. A. Crüwell who had the good fortune on his Haputale estates,—now owned by Mr. Lipton,—to have in 1873 a fine crop on his coffee trees. It had been reckoned early in the year that the value of his properties fell short of the total debt on them by at least £10,000. Before the year was out Mr. Crüwell had sold the estates for £50,000 to the late Mr. R. B. Downall, had paid off all debts, and retired with a very substantial fortune, the balance of the purchase amount and of the proceeds of sale of the big crop sold at 120s. to 130s. per cwt. in London! Mr. Crüwell followed Mr. W. M. Leake to England in a very few months, summoned his friends to a sumptuous dinner to celebrate his good fortune, not least among his guests being his late Agent, Mr. W. M. Leake.

The "boom" in coffee in 1873 being brought about solely by the rise in price of the produce, was doomed to be shortlived so far as the value of Ceylon land was concerned. No enhancement of price could compensate for the falling-off in crops, and not many years elapsed before instances were frequent of collapses in the value of estates as sudden and as startling as was the prosperity that had attended Mr. Crüwell's venture. To mention an instance: in 1876 many estates had good coffee crops, prices were very high, and profits were very large. Among the rest Nilloomally, in Kelebokka Valley, gave returns stated at £6,000 to £7,000. It was currently reported that an offer of £40,000 was made for the pro-

* In explanation, the Editor has to say that no one who knew the young districts in 1873 anticipated that they or Uva were to decline at any rate for a generation, as the old Kandy districts had done, and the figures for total crops of coffee will bear us out in this:—

Season	=	1871-2	cwt.	576,878
"	=	2-3	"	860,360
"	=	3-4	"	509,329
"	=	4-5	"	988,328
"	=	5-6	"	688,434
"	=	6-7	"	927,093
"	=	7-8	"	627,246
"	=	8-9	"	824,058

perty and refused. The subsequent profits from the coffee on the estate can have been next to nothing.

Such were the ups and downs of fortune attending the last days of the reign of KING COFFEE.

TEA,

though it will surely have its bad as well as its good times, is hardly likely to be subject to the convulsive fluctuations of fortune that attended the downfall of coffee.

On retirement from Messrs. Keir, Dundas & Co., Mr. W. M. Leake hesitated as to his course in the future. His partiality for Ceylon and life there was finally overborne by family considerations; his elder children were growing up and continuance in Ceylon would necessitate separation for educational purposes. He determined to find work, if possible, at home. In 1874, co-operating with Mr. T. G. Wainwright, now Treasurer of St. Thomas's Hospital, he started the TUNNEL PORTLAND CEMENT WORKS CO., LTD., buying as the site for its operations a property of some 700 acres on the Essex shore of the Thames near Purfleet. The cement trade was at that time at the height of its prosperity. In common with nearly all productive industries in England, it has since come under changed conditions owing to the continued fall in prices. The fall in prices having been general without any compensatory fall in wages, shareholders in those industries, wherein labour forms a large proportion of the cost, have had to stand by while the position of the labourer has been year by year improved. In these circumstances it may be hoped that the good of the many, may in the long run prove to be the good of all, and that the wider diffusion of wealth, consequent on the economical position, may be surely, though silently, broadening the foundations of the prosperity of the United Kingdom.

Certain it is that demand in many branches has lately acquired a way of increasing by leaps and bound beyond all past experience. And though facilities for extending production are now-a-days such that no continuanee of very high priees can be expected; yet in many depressed industries there have been of late signs of recovery and of a return even to the eapitalists of a eertain sober, healthy prosperity. It is pleasant to add that Portland Cement, the leading industry of the Lower Thames and Medway, seems to be sharing in this revival.

Here, we leave the story of one of the best-equipped, most enterprising and most respected Colonists who ever laboured in Ceylon. The work of Mr. MARTIN LEAKE is by no means over: though in his 67th year—14 of those spent in the tropics—any one looking at Mr. Leake would take him to be at least ten years younger, and, humanly-speaking, his spare athletic form and vigorous constitution afford a guarantee for a number of years of usefulness; not least in connection with the Colony in which he has done such good and prolonged service. So mote it be!

AUSTRALIAN ORANGE PLANTS.—Messrs. Thompson & Co. have imported a parcel of young orange plants from Melbourne to the order of some upcountry planters. The plants were sent up a couple of days ago and we hope to hear of their vigorous growth. —*Cor.*, local "Examiner."

INDIARUBBER IN THE HUKONG VALLEY.

[BY H. N. THOMPSON, ASSISTANT CONSERVATOR OF FORESTS, BURMA.]

The India-rubber as found growing in the Hukong valley is not a gregarious tree. It appears scattered generally through the dense evergreen forests, but nowhere reaches the density per acre, say, of an average teak forest; occasionally a family group of four or five trees may be met with, but these are very rare indeed, and the usual thing is to come across a mature tree every 200 or 300 yards in the richer forests. The average of four valuation surveys made at the headwaters of the Namkong *chaung* gives ·48 large trees per acre. *Ficus elastica* is essentially a light-demanding species, and though an evergreen and associated with and growing amongst dense shade-bearers no tree can be more exacting in its demand for light. Whenever it is surrounded with dense shade it will be found that this tree, in order to escape from it, has grown to enormous heights, in many instances towering head and shoulders over every other tree in its vicinity. Trees of great size were met on the upper slopes (3,000 feet) of the Loima hill at the headwaters of the Namkong *chaung*, and some of them were certainly the largest trees that I have ever seen of any species whatever. In accordance with its light-demanding character seedlings growing on the ground are extremely rare, and though I searched diligently for them on many occasions on the rich soil surrounding the parent trees (but covered with dense shade) I was never able to find one. The only seedlings seen by me were growing, as a rule, in the forks or crevices in the bark of light foliaged trees (*Dalbergias*, etc.) at a great height from the ground and occasionally on the half-rotten trunks of dead and dying plants in places where from windfalls or otherwise clearings had been formed in the leaf canopy. The young seedling thus gets a good start over its rivals in the struggle for existence and grows rapidly up the stem of its host encircling the latter with its aerial roots and sending them downwards towards the ground till they form great supports on which the main trunk of the fig stands; meanwhile the host is gradually killed off and eventually disappears altogether, and the rubber tree is left standing on five or six or even more thick aerial roots. These roots often start from a height of 60 to 90 feet, and attain girths of from five to eight feet. The main factor determining the distribution of *Ficus elastica* seems to be an excessive humidity of the atmosphere. It appears to be able to accommodate itself to many varieties of soil (probably because its earlier stages are passed on a host) and to be indifferent, generally speaking, to rather large variations in altitude, though growing best at from 2,500 to 3,500 feet. The absence of a very high temperature would also seem to favour its growth, as the species is unknown from the otherwise suitable localities in Southern Tenasserim. However, this latter point may or may not be correct, and very likely the question may be complicated by the correlation of factors that we are not as yet cognizant of. But this much is certain, that it is found growing in abundance on the Loimaw hill at an altitude of 5,200 feet, and is reported from high altitudes in the Jan Mun Bun mountains to the east of N'tupusa and on the nothern and southern watersheds of the Taron river, the higher crests and peaks of which are covered with large masses of snow in the winter. From what I could make out of the information given by the Singpho Chiefs of Ningbyen and N'tupusa, it does not appear to actually grow in places that are subject to snowfalls, but is found in all the deep, damp gorges on the slopes on such hills, very often creeping up the former to considerable altitudes. The winter snowline in the latitude of the northern portion of the Hukong valley (latitude 27° north) would apper to lie at least somewhere between 7,000 and 8,000 feet. As Colonel Woodthorpe and Major Macgregor, on their return

journey from the Bohr Khampti State, found it lying in large patches on the Chaukkan and Mokoshat passes in April; these passes lie to the north-east of N'tupusa and are visible from Ningbyen; the heights are 8,450 feet and 7,000 feet respectively.

If the tree does actually grow high up the mountains on the north-east it must experience severe winter frosts, but it is probable that the influence of the latter is modified to a certain extent by the position of the seedlings on the stems of their hosts, and they very likely do not suffer to the same degree as they would if growing on the surface of the soil.

Mr. O'Bryen, in his report on the India-rubber forests of the Bhamo district, divides those situated in the Hukong valley into the following areas, basing his classification on the routes by which the rubber is exported. As these divisions are convenient for the purposes of description, I will not disturb them. They are:—

(i) The tract north at the Tanaikha from its junction with the Tarom river to a point 20 miles above Lagang village.

(ii) The southern basin of the Tanaikha from the Numgaum *chaung* down to a point 20 miles above Lagang village on the Tanaikha, excluding the sources of the Nampyu *chaung*.

(iii) The area drained by the Namkong *chaung*, north of Kamaing, including the sources of the Nampyu *chaung*.

(iv) The area drained by the Tanaikha south of a point about 20 miles above Lagang village and the left drainage of the Namkong *chaung* between Kamaing and Mogaung.

To this I will add, as No. VIII, the whole drainage area of the Taron river above its junction with the Gedu affluent, the greater portion of the India-rubber from this tract being exported to Assam, *viâ* the passes across the Patkoi range.

The protection of the rubber forests.—As before mentioned the Upper Burma Forest Rules relating to the tapping of India rubber trees appear to be a dead letter in the Hukong Valley and Namkong forests. And I have been informed by several Sawbwas, such as Ningbyen and Nitumtumsa, that they are unable to enforce these rules or attempt to interfere in any way with the rubber collectors. Doubtless they have their own reasons for not interfering, as the more rubber that is collected the greater the revenue paid to them for it. So it is not likely then that in the absence of any means of enforcing the rule the latter will be attended to.

Regarding the Hukong Valley itself, I think we are powerless to protect the India-rubber forests by any legislative methods unless we are prepared to take the country over and administer it directly.

The Singphos are an exceedingly independent race, and at present *really* recognize no one as masters, under these circumstances, if we are not prepared to take over the country, and if we still wish to preserve the rubber forests from extermination, there is only one course left open to us, and that is to put a prohibitive tax on all rubber exported to the Myitkyina district from that valley. Of course there will be a great outcry from the Chinese firms engaged in the trade and from others, but unfortunately the choice of alternatives is very limited, and no half-measures are possible. The forests must either be completely protected or left alone; the Singpho would appreciate no other course of action.

I very much doubt whether the Hukong Singphos would understand very early why (in the event of a prohibitive tax being introduced) there would be no sale for their rubber. All they would concern themselves with would be the fact that there was no sale for it, and that therefore it was not worth collecting. There naturally would be a great falling off in the revenue, collected by the various Chiefs, and it is difficult to see in what way they could recoup themselves, and perhaps this is the most important objection to the introduction of such a tax.

The protection of rubber trees growing in forests situated within our sphere of direct administration, though a difficult matter where Kachins, (Singphos) are concerned, need not present any really serious obstacles, and it is possible that if reserves are made of the richest areas, and the local Sawbwas in whose jurisdiction the reserves would be situated were induced to interest themselves in the protection of the forests, and that the subordinate forest officials appointed to supervise them were selected from amongst some of the better class of Singphos, a great deal may be done towards the protection of this tree.

Work would be found for those who at present live on the proceeds derived from collecting rubber by getting them employed in the plantations.

Formation of rubber plantations.—For experience gained in Assam, it appears that it is quite possible to undertake the creation of rubber plantations on an extensive scale with a fair prospect of their supplying large trees in the future. Under these circumstances it would be advisible to start such plantations in the richer India-rubber bearing tracts on the lines recommended in Assam. Local Kachins could be employed for the work, which they would probably take to readily. Seedlings of the species are frequently found planted round the Kachin villages, but they do not attain the same dimensions as trees that have grown upon the forest.—*The Indian Agriculturist.*

CULTIVATION OF THE CHERIMOYA IN MADEIRA.

While on a visit to Madeira last autumn I was much interested in observing the extensive cultivation of the Cherimoya (*Anona cherimolia*) which is now being carried on there for the London market. Many of the estates on the warm southern slopes of the island, formerly covered with vineyards, have now been systematically planted with the Cherimoya, the sheltered valleys being particularly suited for them, the trees attaining a height of 30 to 40 feet and bearing abundantly. Propagation is by seed only. The young trees are grafted when about two years old and begin to bear about three years afterwards When the leaves have fallen in May the trees are pruned, only those branches which are likely to bear fruit being left. On some plantations the young trees have been topped when about eight feet high and the laterals trained along horizontal espalier s with excellent results. The trees are in this way brought under thorough control, can be easily pruned and the fruit thinned out. Stable manure is usually dug into the ground over a considerable area around the trees in the early spring months. The crop is gathered in December and January. As the result of cultivation several improved varieties of the Cherimoya have been obtained bearing fruits with hardly any seeds and in which the fleshy eatable part is largely increased in quantity. The fruits vary in weight between three to eight lb., exceptionally large ones may reach 16lb. and over. The maturity of the fruit is indicated by the loosening of the seeds inside which may be felt when the fruit is shaken. They are still quite hard to the touch but fit to pick and if laid in straw will rapidly ripen. The fruit is always cut off the tree with a sharp knife leaving a short stalk attached; if it is pulled off the core is injured and the pulp spoiled. Special boxes are made for packing the fruit which are first wrapped in paper and then embedded in straw; each box holds about two dozen fruits. The journey to London generally occupies four days. On arrival they are unpacked and placed on shelves in a warm room where they quickly ripen. Average-sized fruits usually fetch from six shillings apiece, larger ones 10s. and more. The Cherimoya grows well in the mountains of Jamaica. Fairly good fruit is not uncommonly brought into Kingston for sale. I venture to think that it might be worth while to bestow more attention on its cultivation in view of the possibility of getting the fruit to London in good condition in cool chambers. The Cherimoya is rightly acknowledged to be one of the most delicious of tropical fruits and there is no doubt that shortly the demand for it will increase very greatly.—*Journal of the Jamaica Agricultural Society.*

Kingston. M. GRABHAM.

TEA PLUCKING AND IRREGULARITIES IN TEA.

We must tell Mr. John Hamilton that the general consensus of opinion both in planting and mercantile circles in reference to his letter is that to abandon "refiring" would be a great mistake. In the moist climate of Ceylon, it is simply indispensable; but it is evident that more care must be taken in regard to both "bulking" and "packing" in not a few factories in our tea districts. At the same time when Mr. Hamilton speaks of "all the selling brokers employing a highly-paid expert to inspect the teas placed in their hands," exception is taken and one gentleman here who knows "all about tea in London" declares the inspection is left to quite a junior—an assistant in his second year usually.

Now as regards the need of special care in estate factories, we have had evidence put before us of very recent experience of irregularity in regard to the teas of well-known Ceylon estates which never sell in Colombo. In all, four cases are adduced as occurring within a few days and all telling against "Ceylon's." For, it is alleged that in regard to Indian teas, there is no trouble: on the catalogues of the latter "bulked in London" is now being printed. We fear it must come to this in respect of "Ceylons," unless each proprietor, who wants to sell in London, insists that special care is taken in his factory as to bulking and packing, due supervision being provided for the same. It is impossible that a Superintendent by himself can see to all the work in the field as well as in the factory. There ought to be a run therefore on careful Factory Assistants, who should be made to understand the penalty attaching to irregularity in bulking, to bad packing, difference in gross tares, or above all to using "cheesy" or bad boxes!

LAND ON THE ANAMALAI HILLS.

To the Editor, Madras Mail.

Sir,—I see that Government Notices appear in the *Madras Mail* and in District *Gazettes* that "about 80 square miles of land on the Anamalai Hills, in the Coimbatore District, are available for application for planting purposes under the subjoined rules." This would be say 50,000 acres. There is, no doubt this quantity "available," but I say without hesitation that the quantity *suitable* for tea or coffee cultivation is represented by a far smaller area. As I am the only one of the original applicants as yet who has begun to open out those hills, I may claim to be interested in their future welfare and development, and neither of these will be served if unsuitable land is taken up and money spent upon it. A new District has to make its reputation and a bad start takes a long time to get over; I trust therefore that any who think of taking up land there will use the utmost care in its selection. As I may now claim to have some little experience of the place, the following facts may be interesting. Health is very good, contrary to the alarmist ideas freely expressed. Fever is practically absent (and I am speaking of the worst time, from beginning of February to breaking of monsoon) both with Europeans and natives; I should say that, man for man, there is less fever than on an ordinary healthy hill estate, though it was not in other places a healthy season this year. The climate is very remarkably even, owing no doubt to the mass of evergreen forest. Wind, before and during the monsoon, is absent on well-selected land, though I should be sorry to have much of the 80 square miles, on this account. I have been there also during the N.-E. monsoon and should say that no one selecting land carefully need get wind at any time of the year. The rainfall is probably abnormal this year, judging from the facts that Cochin and Calicut are many inches over their average to date, and that S.-W. rain at these places has, on every occasion this year, meant rain on the Anamalais, though in far less quantity at the latter place. As I have only had a rain gauge in position since the beginning of February I cannot yet say for certain what the result will be, but from results to date and what I have observed when there in September and November, I am inclined to forecast an average rainfall of something under 100 inches, heaviest in June and July but with a good N.-E. fall and enough in earlier months to ensure setting blossom (this year the fall from February to June was 11 inches 18 cents). Labour, of course, has all to be imported, and I may mention that the greater distance it is brought the better; labour from the small villages round the foot of the hills is of little use. Felling costs far more than in most districts, the forest being very heavy; pitting would be easy, but for roots, the soil being a sandy loam of great depth, with perfect drainage. I should mention that my remarks on health refer to an elevation of 4,000 feet, where I have my buildings, the clearings being a couple of hundred feet lower. I have no doubt of the future of the Anamalais as a planting District if care is taken at the outset, and it is to that end that I would speak a word of warning against indiscriminate selection of land while there is yet time. Every district has suffered from it. Experienced planters are the men first wanted in a new District, and I hope that is the only class which will attempt to settle there to begin with. A good bridle path is now open into the forest, passes my door, in fact, but I do not think the line of the bandy road promised by Government is settled as yet.

Kotagiri, 30th July. E. G. Windle.

NOTES FROM MAHÉ, SEYCHELLES.

VANILLA

The beans resulting from last year's flowering have nearly all been gathered, and are in course of preparation. Although much smaller than the previous year the crop generally will be a fairish one so far as is yet known. In the lower parts of the island the first flowers of this season are commencing to appear.

Apart however from Vanilla and its attendant uncertainties as to crop and price, there is an increasing source of productiveness here in *Liberian Coffee*. A good deal has been done in planting out of late years, and although slow of growth at first, the trees once established are flourishing well, and many can be seen here now of 4 and 5 years' growth, pictures of health and beauty and in full bearing. H. T.

The Kelani Mills.—The mills were opened recently, and dessicating works is in full swing now. Besides this work, the mills are manufacturing coconut fibre for various purposes. As a result of the opening of the mills a large number of villagers have found work to keep them from idleness.—*Cor.*

SIR GRÆME ELPHINSTONE ON THE PLANTING PROSPECT OF PERAK.

"This will be a grand country in 20 years. Coffee Liberian, coconuts and rubbers; cattle feeding also will pay well. Somehow or another one always feels in touch with Ceylon here. So many of the Civil Servants and Planters have been and are associated with Ceylon either by relationship or business. Then in the lower grades of the Civil Service all departments and especially in the medical are recruited from Ceylon.

"I never look on this country except as having a sort of cousinship with Ceylon and that together they will help to supply a large proportion of the world's requirements.—GRÆME ELPHINSTONE."

PROSPECTS IN NYASALAND. INTERVIEW WITH MR. ALEXANDER WHYTE.

Mr. Alexander Whyte, the well known botanist and naturalist, formerly head of the Scientific Department in the Administration of British Central Africa, has just been in Aberdeen for a few days, on his way through to Braemar, where he intends spending a well-merited holiday after his arduous exploratory and scientific labours in Nyasaland, of which some account has already appeared in these columns. Mr. Whyte is looking hale and hearty, and none the worse of his experiences in British Central Africa, where indeed during all his stay of six years he has enjoyed exceptionally good health, having never been once down with fever. The collections which he has made of the dried plants and of the birds and the animals of the country are very extensive—among the most extensive made by single scientists it is believed—and the authorities at Kew and at the Natural History Museum in Cromwell Road are highly pleased with the results. The Zoological Society have rewarded Mr. Whyte by presenting him with their model in regard for the value of his investigations. Mr. Whyte speaks in glowing terms of the progress made in this Protectorate, now our newest Crown Colony. A review of what has been done during the past half-dozen years is truly astonishing, and it would be difficult to point to such a record of work effected for anything like the same expenditure of money in any other country or colony. The very tribes who were the most hostile and the most obstinate to submit to British rule and to abandon their slaving propensities are now furnishing the best recruits for the military and police forces. The revenue is increasing by rapid strides, and nearly all the tribes are willingly paying the tax of 3s. levied on every household.

Of the wonderful

NATURAL CAPABILITIES OF BRITISH CENTRAL AFRICA

Mr. Whyte is well qualified to speak. The most serious obstacle to the rapid development of the country, he says, is the want of easy and cheaper means of transport to and from the coast. Fortunately, however, this is to all appearances about to be remedied. A railway survey from Chiromo, at the junction of the Ruo and Shire rivers, to Blantyre has been most efficiently completed and laid down on a large scale by Mr. Macrone, who is now home in Edinburgh, with all the requisite details and information to lay before his directors. Britain in self-protection must push it on, so as to secure for herself the most advantageous highway, *via* the Lakes, into and through Central Africa. Between the sea and the terminus of the proposed line at the Ruo and the Shire rivers, the Zambesi river steamers provide a transport, but the railway which the Portuguese are making from Quilimane to the same point will in a short time provide more convenient and quicker communication.

Of the prospects for

COFFEE

—the staple of the country—Mr. Whyte speaks in a very hopeful way. The soil and the climate are quite suitable. Mistakes have naturally been made through the want of experience. The coffee bush requires special treatment, and it does not follow that what suits it in one country will be equally successful in another. Hitherto the coffee planting in Nyasaland has been in a measure passing through the experimental stage. Now, however, the treatment of the coffee, especially as to shade, is better understood, and crops, paying very fairly, are being picked. The transport question once solved, land for coffee planting would, Mr. Whyte feels sure, be taken up on a large scale.

Among the other products likely to prove remunerative in British Central Africa Mr. Whyte considers the next best to coffee to be

RUBBER,

which is indigenous in the land, and the demand for which in the world of commerce is continually increasing. The Landolphias, the best yielders of rubber, are growing in Nyasa, ready to be tapped in the native state. Samples of the rubber from this plant Mr. Whyte gathered and sent home to this country. His idea of how to cultivate the rubber trees would be to plant them in forests at the foot of other trees, which would serve as stakes up which they could climb. This would be an inexpensive method of establishing forests of rubber, and the only drawback is that it would entail the locking up of capital for five or six years before yielding a return. The Ceara rubber also grows freely in the Shire Highlands, but it has not been found productive enough to pay. Another product which has already been introduced, and which promises well in the lower and hotter districts is Liberian coffee, while cardamoms, nutmegs, and spices might also be grown to advantage. Cacao Mr. Whyte has tried to introduce on several occasions, but without great success. The cacao plant is very delicate and difficult of transport, but Mr. Whyte feels confident that there are many suitable localities along the banks of the rivers and in the mountain ravines where it would do admirably if once started. As to cotton, it could be grown to a boundless extent, but the cost of conveyance is at present killing to this branch of agriculture. Tapioca has been manufactured to a considerable extent by the members of the Established Church Mission at Domasi from the roots of the manihot or cassava plant, and has proved of excellent quality, finding a ready sale among the Europeans of the district. Arrowroot could also be cultivated, and in fact nearly all tropical and sub-tropical economic plants could find suitable habitats in Nyasaland. Stock of all sorts thrive well on the plateaux of west and north Nyasa. Cattle are now plentiful with the planters, supplies having been got from Tete, on the Zambesi, and from Angoniland, to the west and southwest of Lake Nyasa. Goats and fat-

tailed sheep are everywhere abundant. European sheep have as yet proved a failure, their fleeces being rendered all but valueless by the quantities of seeds and burns which become entangled in the wool.

As to the

HEALTH OF EUROPEANS

in British Central Africa, it cannot be said to be good. There is little danger to be dreaded from the ordinary malarial fever, but unfortunately a bad type, called black-water fever, sometimes crops up, and a good many valuable lives have fallen victims to it. Mr. Whyte, however, believes that a great improvement will come about when the country is opened up and more comfortable houses and surroundings become available. He remembers well when some of the West India islands and Ceylon were quite as unhealthy. Now they are in some cases being visited as health resorts, so salubrious have they become. In Nyasaland, the services of a staff of experienced and skilful doctors sent out by Sir Harry Johnston are now procurable, and Dr. Kerr Cross, formerly of the Livingstonia Free Church Mission, and Dr. Grey, of Portobello, have just sailed to join the Administration. The work recently completed by Dr. Cross on "Health in British Central Africa" will form an excellent guide for young men emigrating. It is all important in Nyasaland, as in all tropical countries, to know how to live, and a man's health greatly depends upon himself, whether he uses judiciously or abuses his constitution. Temperate yet active habits, with a well-balanced, cheerful, and equable mind, backed with a good thick stratum of common sense, are golden possessions out in Africa, where many trials and worries have to be encountered. Mr. Whyte describes with regret how practically the whole trade of the East Coast of Africa from Delagoa to the Red Sea has passed out of British hands through the enterprise of foreign, and especially German competitors.

Asked his opinion on the

MISSIONARY QUESTION,

Mr. White has no hesitation in saying that missionaries have been a great power in the land in influencing the natives. A great deal has been said of missions of late, and it is very easy, and so far legitimate, to criticise public bodies. Unfortunately, however, missions frequently undergo very unjust criticism. Of the work done by Dr. Laws and the free Church Mission Mr. White speaks in unqualified terms of praise. It is, he says, perfectly astonishing to witness the hold Dr. Laws has on the people and the influence he exercises over them.

Mr. Whyte's last

EXPLORATORY WORK

before his present return home was done in the Masuka Mountains, on the German boundary to the north-west of Lake Nyasa. Here he found a most interesting race of people. They were very shy and suspicious, and although he sent scouts and guides with presents to attract them, it was days before he got into touch with them. When he at last succeeded in getting the chief and some of his headmen to visit the camp and in gaining the confidence, of the people, he found them a most kind, docile, and tractable race, a branch of the Wankondi. The chief and his headman invited Mr. Whyte to come and reside with them and be their Chief. They promised to carry timber for him and build a house if he would only settle with them and plant coffee. They are extremely cleanly and tidy in their habits, and their villages, which were well stocked with cattle, sheep, and goats, were patterns of tidiness. Mr. Whyte was more than surprised to find that public latrines, neatly constructed and screened off from sight, were in universal use throughout the villages, a striking contrast to the tribes further south, on whom it is very difficult to impress the value of sanitary measures.—*Aberdeen Free Press.*

TORTOISE-SHELL.

Mr. Frank S. Smith writes:—A good deal of the world's supply of tortoise-shell comes from the Solomon Islands. The term 'tortoise-shell' is one of many misued terms in common use. The shell is not obtained from the tortoise, which is a land animal, but from the hawksbill turtle, an inhabitant of the sea. All of the turtle family that I have come across are shellbacks, but, with the exception of the hawksbill, the shell is practically valueless. That of the hawksbill turtle is dark brown when on the back of the animal, and bears very little resemblance to the burnished and beautifully—mottled article seen in shops. It is not until the shell is cleaned and polished that the dark spots appear. The turtle from which the shell is taken lives in the sea just off the Solomon Islands. It varies in size greatly. I have seen them weigh up to 4 cwt., when it required the united strength of four men to overturn one. The female turtle comes up out of the sea at nights, especially when it is moonlight, to lay her eg s on shore. This is the time, and the only time, that the natives are able to catch turtle. They go in groups to the shore where experience has taught them to expect the turtle, and they wait silently in the grass undergrowth till the animal appears. Presently a broad dark form is seen moving slowly, laboriously, and cautiously from the water's edge up the sandy beach. It stops every now and then, and at last finds a spot suitable for depositing eggs. The natives at once rush out, get hold of the shell, and before the unfortunate wanderer knows what is the matter they give one simultaneous heave and it is lying helpless on its back. Unless they over turn the turtle they could not prevent it from forcing its way back to sea. Blows on the back would injure the shell and not incommode the turtle greatly. When the animal is on all-fours the head is concealed, and it is impossible to get at the legs. Once on its back it is powerless. The natives tie the legs firmly together, and, after tethering it by a rope, put the turtle right side up again. A burning torch of resinous bark is obtained and passed up and down the back till the heat releases the shell. The shell is not in one whole piece, but consists of nine parts, which overlap like fish scales. The heat loosens the joints, and the pieces are then pulled off. If the islanders have plenty of food, the turtle is then released, when it goes off to sea in a bruised and painful condition, and sets to work to grow a new shell. But the new shell is of no commercial value, being thin and colourless. More often the turtle is killed and its eggs abstracted and eaten. It is only at spawning time that turtles come to land, and only the females come then. The shell is worth up to £1 15s. per lb. in London, and up to £9 worth is sometimes obtained from one turtle. As a small tortoise-shell comb costs £1 5s, or thereabouts, it may be believed that most of what we see exposed is imitation.—*Western Star*, Aug. 1.

Creepers in Southern India—seem to be able to manage more economically than in Ceylon when we are told—see letter in our *Tropical Agriculturist*—that "while R100 a month is better than "R75 and R75 than R50, no man need starve or "even stint himself if he has R50 a month to his "name."

COCONUT PROPERTY IN CEYLON.

Value of Coconut Property.—No doubt the respective merits of the plantations sold yesterday justified the wide difference between the prices paid. For Letchimey estate, 248 acres, in the Chilaw district the price paid (R162,000) works out to nearly R660 per acre; while for Setavana estate 100 acres in the Puttalam district, the rate is just one-half or R330 per acre, the price being R33,000. We suspect that the popularity of the Chilaw district had a good deal to do with the difference.

A merchant writes:—

"Your reference to the sale of Letchimey and Setavana coconut estates, in issue of 12th inst., is surely based on insufficient information. The two estates are within a mile of each other."

This has reference to our finding an explanation of the one realizing double the price of the other per acre, in the one estate being described as situated in Chilaw, and the other in Puttalam district. We now understand that there was some reason for the lower price not connected with the coconuts, soil or situation.

We lately mentioned that Aspokunawatte, the property of Mr. Melville White, in Kurunegala district, had been sold. The purchasers (or their Agents) are Messrs. Finlay, Muir & Co., and the price paid is R48,000 for a total area of 365 acres, of which fully 200 acres are planted with Coconuts and some Cacao and Liberian Coffee. This ought to be a bargain for the purchasers if the palms do well.

THE TREATMENT OF TEA IN THE LONDON WAREHOUSES.

(To the Editor of the *Home and Colonial Mail.*)

Sir,—It seems to me that the time has come for the Indian Tea Association to take up the question of the proper repacking of tea in the London warehouses. The objectionable method at present in vogue has been repeatedly shown up in the English and Indian press, in public lectures on tea in representations to the Association itself, and in the elaborate work on tea lately published. So far as we tea planters know only one warehous has thus far shown itself open to improvement, and has brought in modern machinery to replace the rough docker's boot for pressing in the tea.

Anyone who has seen the present barbarous method in operation will, I am sure, agree with me that it is unworthy of the present century, and to an Indian or Ceylon planter who has been used to the utmost care in packing teas it is simply shocking.

If something is not done soon to improve matters the question will find its way into the magazines and daily papers, and we will have illustrations showing a heap of tea being shovelled into chests, and a row of dockers jumping upon it and stamping it in with their boots. It is a disgrace to civilised methods.

The question of cost is no doubt a great factor in all improvements, and the warehouse authorities seem to have thus far overlooked the fact that by using machinery they would probably save the cost of half a dozen men by each machine put into use.

As a planter I am anxious to push the subject, because I find that by using machinery I can get more tea into a chest, and thus effect a considerable saving in cost of packages and transit; but then I tremble for our fine teas when they come under the heel of the ruthless docker, for if ordinary stamping is not sufficient, such violence will be used that there will be nearly as much dust as leaf when the chest comes to be opened by the grocer.

Another point which urgently needs to be dealt with is the manner in which the chests are closed up after repacking; the shreds of torn lead being merely laid on the top and the lid roughly nailed down. Sometimes a bit of brown paper is added if the lead is in a very bad state. Why should not the packages be properly soldered up?

The Indian branch of the Tea Association has recently had a committee to inquire into the treatment which packages receive in Calcutta. Why should the Association in London continue to countenance and perpetuate a crying evil which causes a continual loss to all concerned and practically ruins a large proportion of our finest teas?—I am sir, yours, &c., Anxious Planter.

—*H and C. Mail*, July 30.

THE CONSOLIDATED TEA AND LANDS COMPANY, LIMITED.

The following is from the report for the year ending 30th November, 1896, to be submitted to the first ordinary general meeting of shareholders of the Consolidated Tea and Lands Company, Limited, to be held in the Accountants' Hall, 106, West Nile Street, Glasgow, today (Friday):—

The directors have pleasure in submitting the accounts for the year ending 30th November 1896. The season, as a whole, has been favourable, the total crop having amounted to 10,620,520lb., against an estimate of 10,410,573lb. The average price obtained was 7·67d per lb. The season's operations have resulted in a profit of £112,228. 15s, to which has to be added the profit derived from the sale of land in Travancore, viz., £63,152 4s—in all £175,380 19s. Against this sum the following amounts are chargeable:—Commissions on profits to managers of estates, managing agents in Calcutta, and secretaries, £11,150 7s; interest to shareholders and others on deposits, £1,039 3s 5d; interest on purchase price payable to the North and South Sylhet Tea Companies, Limited, £55,811 11s 9d; dividend paid to the first preference shareholders of the company, £12,912 4s 10d: dividend payable to the second preference shareholders of the company, £7,231 6s 8d—leaving a balance of £87,236 5s 4d to be dealt with. Out of this the directors propose to pay a dividend of 10 per cent on the ordinary shares, which will absorb £8,000, to place the sum of £65,000 to a reserve fund, and to carry forward to next year a balance of £14,236 5s 4d.

The latest reports from the company's visiting agents and superintendents show that the estates are in good cultivation, and that the estimates of yield for the current season, viz, 11,486,300 lb., will probably be realized. During the year under review 4,827½ acres in India and Ceylon have been cleared and planted. Of this area, 4,148 acres have been planted with tea, and 679½ acres with cocoa, coffee, and coconuts, bringing the total planted area up to 32,257¼ acres. A further area of 4,337 acres will, it is hoped, be planted in 1897, chiefly in Assam and Ceylon.

As mentioned in the circular of May 21, 1897, to the shareholders, the directors have concluded an agreement with the Amalgamated Tea Estates Company, Limited, to work the whole of this valuable property on joint and equal account. It was the original intention of the directors either to sell portions of the company's property or to form various subsidiary companies, but further experience in developing it showed them that the introduction of competitors would probably tend to enhance the rates of labour considerably, and otherwise add to the cost of cultivation. It was therefore arranged to form the Kanan Devan Hills Produce Company, Limited—the shares to be held by the Consolidated and Amalgamated Companies equally—to purchase the land and estates of the company in the Travancore Concession for £146,525, being the valuation arrived at after careful inspection, by Mr. William Milne and Mr. Leyburn Davidson. This has accordingly been done; and this arrangement, while preserving the advantages of one proprietory, secures the necessary capital for the rapid development of the

undertaking. With regard to the proposal to sell four of the company's Ceylon properties to a subsidiary company, the directors have decided not to dispose of these meantime. As to the amalgamation of certain other of the company's estates in Ceylon with those of a neighbouring company, the Consolidated Company have now concluded an agreement to amalgamate their holdings in the Bambarabotua Valley with those of the East India and Ceylon Tea Company, Limited, in that district. The properties of both companies will be valued by Mr. Joseph Fraser, tea planter, Matale, Ceylon, and taken over by the new company, to be called the Hopewell Tea Company, Limited, which has been formed to work the amalgamated group, as from September 15, 1897. The shares in the new concern will be held as to two-thirds by the Consolidated Tea and Lands Company, Limited, and as to one-third by the East India and Ceylon Tea Company, Limited. This amalgamation will lead to greater economy in working, and consequently to more profitable results.

The directors have to advise the purchase of the Soongachi, Oodllabari, and Gajilidubah Estates, situated in the Dooars, for the sum of £16,000. Soongachi lies midway between two of the estates taken over by the company from the North Sylhet Tea Company, Limited, and as the three properties practically make one division, considerable economy in working will result from their being under one superintendent. The Oodlabari and Gajilidubah estates having been grouped with Soongachi at the auction sale, had to be bought along with the latter property, but as they were not favourably situated for being worked economically with the other estates of the Company in that district, the directors decided to sell them on the first favourable opportunity. This occurred last January, when the price of R32,500 was obtained for them. Since the close of the financial year, the directors have also bought the Kumla estate, Dooars, for R270,000. This garden lies between two of the Company's properties, and its acquisition will lead to more economical working on the Dam Dim Division. The directors propose making a call of £1 per share on the ordinary shares, payable in September.—*H. and C. Mail*, July 30.

COFFEE COMPANY'S REPORT.

THE DUMONT COFFEE COMPANY, LIMITED.

The following is from the report presented at the second ordinary general meeting:—

The profits for 1896 were guaranteed by the vendors at £120,000. This sum was duly paid to the company, the appropriation of same being as follows: —Expenses to December 31st 1896: In London, £2,278 11s 7d; in Brazil, £754 16s 1d. Less amount of interest and commission, £834 5s 1d; writing off the entire preliminary expenses, £3,327 2s 3d; interest to December 31st, 1896, on the five and half per cent. first mortgage debentures, £5,100 15s 11d; dividend to December 31st, 1896, on the seven and half per cent. cumulative preference shares, £6,109 14s 9d; dividend to December 31, 1896, on the ordinary shares at the rate of 10 per cent. per annum, £8,145 16s 5d; interest on pre-payment of calls, £199 1s 9d; amount placed to reserve account, £83,506 17s; amount carried forward to 1897, £11,411 9s 4d; total £120,000. The actual profits of the Companhia Agricola Fazenda Dumont for 1896, after providing for all outstandings on the estates, amounted to R2,441,024$691, which sum calculated at the average rate of exchange ruling throughout the year, is equivalent to £92,605 12s 5d sterling. This short fall in the profits is mainly attributable to the heavy drop in the price of Santos coffee, and to want of care and supervision in the harvesting and curing of last year's crop owing to the ill-health of the vendor's manager. A large difference arises, moreover, in the conversion of the profits into sterling at the average rate of exchange for 1896, as against the rate at which the auditors based their estimates in the prospectus. The crop, which had been calculated at 80,357 cwt, amounted to 74,115 cwt. Your directors were not in a position to exercise any control over the management of the property until January 1st last. Since then steps have been taken to introduce a better system of management and to add considerably to the machinery and appliances for curing the coffee crop. A considerable quantity of new machinery has been purchased, and some of it is already erected and in working order on the estates. The benefit of these improvements will only be partially felt during the current season, but when completed they will undoubtedly materially improve, the quality of the coffee and consequently the prospects of the company. The directors have further engaged a gentleman of experience, who will shortly proceed to Brazil to thoroughly examine and report on this machinery, and to advise regarding future requirements in this direction. The lands planted with coffee, stated in the prospectus as being about 13,000 acres, have now been surveyed, and are found to cover an area of 13,461 acres, of which about 9,800 acres are in bearing and 3,661 not yet in bearing. Latest advices from the managing director show that the estates are in a satisfactory condition and more labour had been obtained. Seven pulpers have been at work day and night on this season's crop, against only two last year, and the new machinery is being erected and gradually brought into working order. The reports and valuations received to date on this pulped coffee are of a most satisfactory character, and justify the expectations of the directors. Three Englishmen have been appointed to assist in the management of the estates, and two of them have already taken up their duties. The company's railway, which is being extended, has recently been favourably reported on, and is now in good working order. The properties have been duly transferred and mortgaged in favour of the trustees for the debenture-holders in accordance with the law of Brazil. The vendor company, viz., the Companhia Agricola Fazenda Dumont, the shares of which are held by this company, has been kept in existence for convenience of working and in order to maintain its local and trade relations. A Stock Exchange quotation has been duly granted for the debentures, and both classes of the company's shares. Mr. C. A. Carlisle, late of Sao Paulo, has joined the board of this company, while Senhor Cornelio Procopio, owing to failing, health, has been compelled to resign the management of the estates, which is now undertaken by Mr. John Buchaman, a director of the company, assisted by Senhor Bourgas. It is hoped that an interim dividend on account of season 1897 may be paid on the ordinary shares in October next, by which time the amount of this year's crop will be known and a large quantity of it sold. As far as the directors can see, the accounts in the future will be closed, so as to admit of the annual general meeting being held in London in the month of April.—*H. and C. Mail*, July 30.

AMERICAN DOMESTIC TEA INDUSTRY.

There has been no question that tea can be grown in certain parts of the United States, nor that it has been successfully grown in South Carolina. The labour problem has stood in the way. South Carolina cannot compete with cheap labour in the Orient. Machines have not yet been invented to pluck tea, and until that day comes domestic grown tea will not figure in the American market, except as a curiosity. There is also a deficiency in rain fall to operate against the successful growing of tea in the United States.—*American Grocer*, July 14.

INDIAN PATENTS.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, in the office of the Secretary appointed under that Act, during the week ending 24th July 1897:—

Improvements in Transplanters.—No. 61 of 1897.—George William Claride, planter, of Harehatch Estate,

North Travancore, for improvements in transplanters, or implements for transplanting plants and shrubs. (Specification filed 15th July 1897.)

Improvements in apparatus for Drying Tea, Grain, Hop.—No. 277 of 1890.—Samuel Cleland Davidson, merchant, of Sirocco Works, Belfast, Ireland, for improvements in apparatus for drying tea, grain, hop, or other substances. (From 13th August 1897 to 13th August 1898.)

Now ceases:—Improved method of and means for the Drying of the leaves of Tea.—No. 302 of 1892.—Lionel Maynard Torin's invention for an improved method of and means for the drying of the leaves of tea and other plants. (Specification filed 19th April 1893.—*Indian and Eastern Engineer*, August 7.

VARIOUS PLANTING NOTES

The Prospects for the Fruit Season—says the Acting District Officer, Ulu Langat (Mr. O. F. Stonor), in the Selangor *Government Gazette*—owing to the long-continued rains, are extremely bad, and the durian crop promises to be the worst experienced for many years. On the other hand, a larger area of padi land is being brought under cultivation than was the case last year, planting being fixed to take place in about three weeks' time.

Colonial Rubber Estates, Limited.—Capital £100,000, in shares of £1 each. This company has been formed to acquire certain territories on the West Coast of Africa, with the sole right to cultivate, gather, and trade in indiarubber from such territories. The purchase price is £80,000, payable as to £30,000 in shares, £10,000 in cash, and the balance of £40,000 in cash or shares, at the company's option, thus leaving £20,000 for working capital. We do not at all like the look of this company, which we should advise investors to avoid.—*Daily Chronicle*, July 27.

Rubber Cultivation by the Ceylon Forest Department has not come to much as yet. Here is the Report for 1896 :—

Province of Sabaragamuwa: Edangoda and Yatipowa Rubber Plantations.—No further additions were made. The para rubber trees show a most decided growth, especially in the flat portions above flood level where wash is not felt. I do not think that it is yet time to tap the dominating trees, but a beginning might be made with the suppressed trees, which will probably not yield much, as the ratio of yield of small trees is much smaller than that of large trees. The experiment with jak on poor chena land near the above plantations cannot be considered a success, especially as the plants suffered from attacks of porcupine and mouse deer. The expenditure of the year amounts to R361·79, and the receipts to R24.

The Growth of Sisal Hemp continues to promise profitable results as a fence plant in the Deccan and as a crop adapted for the most exposed positions on the Western Ghats, under a heavy rainfall. A single offset planted out three years ago at Khandalla, where the rainfall is excessive, has now leaves 4 feet in length; it is planted in stony soil and has not received special culture. A plantation of 170 young offsets has been made near Nandgaon on the crest of the Western Ghats, 12 miles south of the railway station at Lonavla. A quantity of Sisal fibre has been prepared from the plants grown at Poona and despatched to Kew for the opinion of experts regarding its value. The rope makers in this neighbourhood say the fibre is very much stronger than that of Agave vivipara which the plants greatly resemble.—Mr. G. Marshall Woodrow, Lecturer in Agriculture and Officer in charge Botanical Survey, Bombay.

The Tropical Agriculturist: A Compliment.—An upcountry planter who never wrote on the subject before, says in the course of a letter received today :—"For a planter I know of no such useful work as the one you monthly produce, and I for one am grateful for the reliable information it imparts."

Sleepers on the Railway.—This is what the Engineer of Ways and Works has to say on this subject in his last year's report :—

Sleepers.—The use of doon, kumbuk, na, and other native wood sleepers that have been supplied by the Forest Department is not economical, as the average cost is R4 each, and the average life four years, while creosoted pine sleepers from the Baltic ports cost R3·69 each, and have an average life of eight years; but if the Forest Department could supply satinwood sleepers at a reasonable cost, they would be very valuable, as they have an average life of twelve or fifteen years.

Australian ironbark (one of the eucalypiti) has proved to be very serviceable for sleepers, as it has an average life of eighteen years in Australia and England. It would be advantageous to ascertain if equally good results could be obtained here.

Prospects in Nyasaland.—On page 232, will be found the summary of an interview with Mr. Alex. Whyte, so well-known in Ceylon, on the above subject taken from the *Aberdeen Free Press*. Mr. Whyte speaks in a very satisfactory, not to say jubilant tone. Certainly Central Africa has done well for him. Remembering Mr. Whyte's age, and his comparatively poor health latterly in Ceylon, nothing has surprised us more than his great success as a pioneer botanist, explorer, collector and agricultural adviser in Central Africa. If Nyasaland is so unhealthy as some men say, how is it that Mr. Alex. Whyte has done so much there without apparently suffering in health? It is clear, however, that further development of the settlement must be slow until the much-needed railway is made.

The Trade of the Philippine Islands.—Mr. Rawson-Walker, our Consul at Manila, states in his last report on the Philippines that the islands number about 1,200 and have a population of over 7½ millions, including 100,000 Chinese. The chief industries are all in the hands of the latter, of whom about 50,000 live in Manila alone. Next to Manila the chief centres of trade are Iloilo, in the island of Panay, and Zebu, where some of the chief British merchants of Manila have branch houses. The protective tariff which came into force in 1891 has caused a large and steadily increasing quantity of trade in cotton goods and yarns to be diverted from the United Kingdom to Barcelona, the chief loss being in the stouter piece goods and in yarns. The trade in fine goods still remains with the United Kingdom, as Spanish manufacturers have hitherto failed to produce cloths made of the finer counts at reasonable prices. For some years past the hardware trade has been gradually passing out of the hands of English firms to German and Swiss houses, so that now the latter have almost the sole importation of all classes of iron and its manufactures. Last year an increased scale of export duties, was put in force with only 24 hours' notice, to the great injury of the trade, and especially of the staple exports, sugar, hemp, and tobacco. The wealth of timber in the islands is incalculable, and it yields resins, gums, mastic pastes, dye products, fine grained ornamental woods, and heavy wood for building. The value of the sugar exported last year was £1,600,000, of the hemp £1,500,000, and of the tobacco and cigars £650,000.—London *Times*, July 17.

THE SWINGING OF THE PENDULUM: AND DEPRESSION IN TEA.

Just at present the adverse influences telling against the tea industry are about as complete as can be. Tropical agriculture is seldom otherwise than a risky trade, and when the planter has low prices, high exchange, heavy cooly advances, dear rice, re-bulking in London, and excessive loss of weight in some cases, to contend with, they all emphasise that riskiness in a most emphatic way. Only a few weeks back, the London financial papers were chorusing in a singularly unanimous manner what a good investment tea was, and singing the favourable outlook of the fragrant leaf; and the charm of the song at the time did much for Tea Companies and Tea Shares. It was the kind of piping to which the British capitalist likes to dance, and he footed the measure after an enthusiastic style. Big prices were paid for favourite estates in high districts, Companies were floated, shares were steadily on the rise, and the man who paused and wondered if everything had been considered, and if there was not just a trifle of inflation in the princely price per acre, did not thereby advance his reputation. He was considered a smart man who bought, and as for the long price paid—well, the places were worth it, and more. This has continued to be the feeling in London indeed up to the end of July; for a financial paper of the 27th ult., received by this mail, sums up the situation in the course of a long article on "Tea Companies":—"altogether, the shares of Indian and Ceylon Tea Companies combine the attractions of good security with what in these days may be called a handsome return in interest to an extent of which there are few examples indeed among the whole range of investments."

Here perhaps we reached our highest point a short time ago; for the outlook — save the fear of over-production — was clear, and the boom was booming. Now there is a change, and the swing of the pendulum is very marked. If elation were the dominant tone before, and the song sung was both high-pitched and vehement, it is a doleful ditty we hear today, and that too in a minor key. The chirpiness has disappeared from Planting circles, and even in the local Commercial Capital there is an under-current of pessimism, with much shaking of heads. The Share List tells its own tale; for, whereas before there was a rush in, there is now a rush out; and it would not be hard to invest in almost any of the Companies therein named, at prices which a few months ago, would have found no sellers. Those with money to invest do not hesitate to tell their brokers, now-a-days, we believe, that they do not want tea shares—anything else but that.

Now, has the bottom fallen out of the Tea industry, or is this renewed swing of the pendulum in the opposite direction just what was to be looked for? As we have said above, there are at present divers causes telling against tea, but we have no hesitation in saying that most of them are temporary, and some although evil at present are really making for good in the long run. Low prices are not agreeable, but we have always found that they were the "open sesame" to many markets which before had been all but closed. Dear rice is only temporary and as yet the losses have been more than covered by a long way by former profits. Heavy cooly advances will work their own cure—though perhaps, some will suffer, for if there is to be "a squeeze" in tea, those who in the day of plenty gave little thought to the matter on the principle of "easy come, easy go," so long as we ges coolies, will be forced to revise their policy. And then, as for the minor troubles in London, if they cannot be cured they will have to be endured. The Exchange question is we admit the puzzler,—the real "Asian mystery"—to prophesy about which, would be unwise even for the wisest. Still, although we claim to be no prophet nor the son of a prophet, we cannot help thinking, that a system of currency which hat a fictitious value—the result of being bolstered up—has a very unstable equilibrium, and is more likely to collapse than aught else.

Meanwhile everything is telling against the tea producer, and the call is urgent for watchful care. With the great markets of America and Russia hardly tapped as yet, our staple industry has no cause to sit down and weep because it has no worlds to conquer. Our tea planters have had a fairly good innings of good times, and there are good times yet ahead; but it may be that for a little the road to be travelled may be rough, and the fare scanty. The Ceylon planter has been reared in the school of adversity: knows what it is to have his nose at the grindstone and will meet a check in a manly way. What we deprecate is the violent swings of the pendulum in public opinion and the tendency to be either soaring in the clouds or grovelling in the dust. Tropical agriculture is always liable to marked periods of action and re-action; and there is no need to be unduly depressed when re-action is dominant as it undoubtedly is at present.

VARIOUS PLANTING NOTES.

THE CONSOLIDATED TEA AND LANDS COMPANY, LIMITED—popularly known in Ceylon as Sir John Muir's Company—deals in very large figures and profits as may be seenby the Directors' Report given on page 234. The latter also affords very interesting information about dealings with other Companies — amalgamations and separations — purchase of estates and profitable re-sales. The parent Company occupies a strong position with £65,000 already in a reserve fund. The Hopewell Tea Company is one of the new Ceylon offshoots, representing the estates alongside of Balangoda.

THE "INDIAN FORESTER."—A monthly Magazine of Forestry, Agriculture, Shikar and Travel, edited by J. W. Oliver, Conservator of Forests and Directer of the Forest School, Dehra Dûn, for July contains the following:—Original Articles and Translations—Shade, Cover and Shelter, Letter from F. G.; Correspondence; Reviews—Forest Administration in Burma, 1895-96; Timber and Produce Trade; Extracts From Official Gazettes; Report on Tour in France—Fire-prevention and the Forest of the Esteral; The Gurnaud System of treating and wo king forests or the so-called *Méthode du Controle*; The present system of Working Plans in France; Forest Management in a backward part of France "*Inspection*" of Bagnères de Luchon, Pyrenees; As above Savoie; Special investigation of Facts and Phenomena connected with the growth and maintanance of Forests. Establishment of Research Burreaux in Germany, Austria, Switzerland, and France.

Arekanuts.—An estate proprietor writes:—
"Many of your readers would be glad if you would publish a market report for *arekanuts.*"
Where can such be got we ask? Not we think in London market reports—the great mart for Ceylon arekanuts being in India; but we have never seen quotations in the Indian papers. The trade is, we suppose, entirely in native hands.

Radiography of Buds.—In a recent number of the *Gardeners' Chronicle*, Mr. G. J. Burch contributes an interesting article, accompanied with figures, upon the use of the x-rays for photographing flower and fruit buds. Mr. Burch and his assistants began by exposing plates of glass of different colours to the action of the rays. The violet glass showed itself much more opaque than that of other colours. It contained alumina and cobalt in addition to the ordinary elements. An experiment was afterwards made with a violet coloured hyacinth, and, as had been anticipated, the flower gave different results from those given by the glass. It was much more transparent. The sensitised plate, after development, showed the coutour of the petals, the veins, and the internal that form of the ovary were well represented. Fortaking such radiographs Mr. Burch advises the use of tubes that give very little light, and that, for example, would scarcely give the contour of the hard parts of the hand. The aeriferous tissues are very transparent to the x-rays. The more water the tissues contain, the more opaque they are. Dry fruits and flower buds give excellent radiographs. The seeds are very distinctly seen, as are also the different parts of the flower.

Jamaica.—The report on Jamaica for the past financial year which the Colonial Office has just published, shows that the colony is, upon the whole, prosperous. It is stated that the colonial public is now thoroughly roused to the importance of giving more attention to the cultivation of products. "There is a growing desire not only to cultivate, but to cultivate well, and to improve the quality as well as increase the quantity of these veral crops." The local agricultural society encourages this tendency in every way. It must be long before the loss on sugar can be compensated for by other products, but the rate of increase in the latter is greater than the decrease no sugar, and for this the fruit production is mainly accountable. The decline in the cultivation of the sugar cane is gradual, but persistent; the increase in coffee, ginger, cocoa, and tobacco has been great; while that in bananas is very much greater. Thus twenty years ago 31.6 per cent. of the total exports was sugar; last year sugar was only 11 per cent., though the value of the exports had increased. The increase in fruit exports, and especially in oranges, is due to some extent to the destruction in the Florida groves by a blizzard in 1894. The value of the imports last year was 2,288,946*l*. against 2,191,745*l*. the previous year, while the exports amounted to 1,873,105*l*. The population of the island is estimated at 690,667. In conclusion, Sir Henry Blake observes that though the year was not one of special prosperity, it was not one of depression in the colony generally. Some industries have not been so fortunate as in previous years, but others have been prosperous. Trade has not largely increased, but it has not diminished, and the value of the imports is greater than in any previous year, showing that the purchasing power of the population has not diminished.—*British Trade Journal*, July 1.

The Dumont Coffee Company Directors—have acted wisely in their generation in putting £83,500 out of their first year's earnings to a reserve fund. This should surely restore confidence, and bring up their shares to par one would think. The Report given on page 235 has much interesting information.

Coffee Husk as an Article of Human Consumption.—Occasionally orders are received at Colombo from the Persian Gulf ports and Aden for coffee husk, the refuse thrown away after pulping the coffee. It appears that the natives there boil the husk, and use it as a kind of tea, or make a preparation and mix it with real coffee. The husk of Liberian coffee is preferred to that of either plantation or native cherry.—*Cor*

Tea Cultivation in Northern India and Ceylon.—Many of our planters should be interested in the chatty and critical letter which "1874" (an Indian tea planter dating from that year) sends us elsewhere. Even if there be nothing much that local men can appropriate or utilise, still it is of interest, to learn how "manuring," "pruning" and "plucking" are dealt with in the different Indian districts named. One piece of advice is worth considering: it is to spend money in manuring rather than in extending tea gardens.

The "Agricultural Gazette" of New South Wales, has the following contents for June 1897:—
—Remarks on the Object and Method of Soil. Analysis; Chemical Notes; Reports on the Darling Pea; The Suppression and Prevention of Tuberculosis of Cattle, and its Relating to Human Consumption (Reprint); Pruning, Budding and Grafting; Pruning the Vine; The Fruit Fly; The City Abattoirs; A Tobacco-Growers' Association; Influence of Bees on Crops; The Treatment of Pelts; Orchard Notes; Vegetable Notes; General Notes; Replies to Correspondents; List of Agricultural Subjects Shows; Label for Specimens.

Japanese Tea Bureaus.—In New York "Bradstreets" of July 3rd we have the following "business note":—

Among the passengers on the steamer "Gaelic," which arrived at San Francisco this week, "was a party of Japanese who have come to this country in the interest of the Japanese government and the Central Tea Association, of Japan, to establish bureaus for the regulation of the tea business here. There is now a bureau in existence in New York, and other bureaus will be established at Chicago and Montreal. The tea bureaus will serve about the same purpose in respect to tea as the viticultural bureaus in the eastern cities do in the regulation of the foreign wine trade.

The Queensland Agricultural Journal is a new publication, the July number being the first part. It is issued by direction of the Hon. A. J. Thynne, M.L.C., Secretary for Agriculture, and the contents of the first number are as follows:—
To our Readers, Some Things we Need, Organisation amongst Farmers, Agriculture—A Paying Crop for the West, Coffee-growing at Cairns,* Dairying—The Dairying Industry in Queensland, The Orchard—Fruit Culture in Queensland, Entomology—Destructive Insects Liable of Introduction to Queensland, Apiculture—Bee-keeping for Extracted Honey, Beekeepers' Association of Victoria, A Tropical Industry—India-rubber (Caoutchouc), Tea Farmers' Conference at the Gatton Agricultural College, Meat Export—Probable Meat Trade with Egypt, Botany—Contributions to the Flora of Queensland, General Notes—Rubber in Upper Burma, The Butter Industry of Canada, The British Import Trade in Eggs, Prickly Pears for Stock, Farming by the Wealthy Classes, The Maryborough Show, The Lockyer Show, Agricultural and Horticultural Shows, Show Fixtures, Farm and Garden Notes for July.

* We shall quote this short paper in an early issue. —Ed *T.A*

"GREVILLEA ROBUSTA."

We call attention to the interesting letter, which a planting colonist, under the well-known signature "Senex," sends us respecting this tree. Our first acquaintance with it arose through a long series of vain attempts made by the late Mr. A. M. Ferguson under the encouragement of Dr. Thwaites of Peradeniya, to grow it at "Aloe Avenue," Kollupitiya. The plants flourished from September till May; but the saline breezes of the South-west monsoon invariably swept away their leaves, and the young trees dwindled down beyond recovery. We should like to know if *Grevillea Robusta* succeeds in the Kalutara or even in the Kelani Valley district? Upcountry, its success, as "Senex" points out, is unqualified. What he says of its uses as a timber-tree is very interesting, especially when coupled with the benefit conferred by its litter of fallen leaves, and through the tree tapping a deep subsoil. Mr. Cantlay of Mount Vernon, who, we suppose, has as fine a display of grevilleas as any planter in the country, ought certainly to get an analysis made by Mr. Cochran of the fallen leaves, to see what his soil exactly gains from them? "Senex" mentions that the tree or its branches are not very useful as fuel unless left to dry thoroughly. He also refers to its ready growth from seed; but would it not be well to get seed as a rule from another country—or at any rate, a different district—and to be sure that it is from fully matured trees?

Since writing the above we find Mr. Cochran has dealt fully with the leaves of *Grevillea Robusta* in his "Ceylon Manual of Analyses" (a book which ought to be in the hands of all thoughtful practical planters). We quote as follows:—

LEAVES OF THE GREVILLEA ROBUSTA.

As the tea plant is found to flourish best under a certain degree of shade, the tree called grevillea robusta, a native of Australia, has been largely planted on Ceylon tea estates. This tree serves the double purpose of breaking the force of the wind and of affording a suitable amount of shade for the tea plant. It is therefore interesting to ascertain how far this tree competes with the tea shrub for the plant food in the soil. With this object in view, two ten pound parcels of leaves were sent to the author for analysis; one parcel containing 10 lb. green leaves, the other 10 lb. of sun-dried old leaves.

It will be observed from the accompanying tables of agricultural analyses of grevillea leaves and the comparison of their composition with that of tea leaves, that, while the tea leaves are very rich in the more important constituents of plant food, viz., the nitrogen, potash, and phosphoric acid, the grevillea leaves are correspondingly poor in these constituents and are very rich in the less valuable lime. The tea and grevillea trees are therefore examples of different trees well suited to grow together on the same soil. It will further be observed that there is a very considerable difference between the grevillea green and old leaves. The latter show a smaller proportion of ash when calculated upon the dry matter of the leaf, and the ash is of inferior quality shewing more especially a remarkable decrease in the lime and potash and a correspondingly large increase in the siliceous matter. Supposing these old leaves to have lain on the ground for some time, part of this difference might not be in the constitution of the leaf; but might be accounted for by mineral matter being dissolved out and a small addition of persistently adhering soil, as an amount of adhering soil which would add a very trifling percentage to the weight of the leaf would add a considerable percentage to the weight of the ash of the leaf.

To the above remarks Mr. Cochran appends several tables of analyses of "Green leaves," "Old leaves, sun-dried," "Dry matter of old leaves," "Ash of green leaves," "Ash of old leaves," and "Comparison of the important constituents of plant food in tea leaves and grevillea leaves." These ought to be consulted by all interested—and what tea planter is not?

CULTIVATION OF COCA ("ERYTHROXYLON" COCA) IN CEYLON.

A planter writes to ask us:—"What was the reason that the cultivation of *Coca Erythroxylon* (for cocaine) was not seriously taken up? I see by an old volume of the *T. A.* that an experimental lot of leaves sent home in 1885 was valued at 13s per lb. The plant is said to be almost naturalized about Peradeniya." Our correspondent will find a full history of our Ceylon experiments so far as they have gone in our "Planting Review" in "Handbook and Directory" pages 132-133. The one or two Ceylon planters who have gone in for coca have no doubt done very well; for the export of "coca leaves" has increased from 956 lb. in 1890 to 3,392 and 3.397 lb. in 1895 and 1896 respectively. The fear of overdoing the market (after the experience of cinchona) has no doubt kept planters generally in suitable districts—from Dumbara to lower Pussellawa (?) or so - from going in for coca. We see that cultivation is extending in Peru: in fact we may as well quote what is said in the very latest Journal of the "Society of Arts" (July 30th) on the subject:—

THE PRODUCTION OF COCA IN PERU.

Before the discovery of cocaine and its anæsthetic properties, the consumption of coca was limited to the demands of those provinces in Peru in which the mining industry was carried on, the miners refusing to work unless they were supplied with coca. Twenty years ago, according to the *Economista* of Lima, the cultivation was only engaged in in districts which enjoyed the most favourable conditions of climate and labour. In the province of Outzco, the systematic cultivation of coca was only carried on in the haciendas of Choquisongo and Sanjumas, and the production amply sufficed for the needs of local consumption and the mining industries of Salpo and Saypullo. For some time past the production of coca has greatly developed, and the province of Otuzco is at the present time the most important producing district in the north of Peru, its production exceeding even that of the provinces of Huamachuco and Cajabamba, not only as regards quantity but also quality. The number of plants is 2,700,000, and the majority of the plants in this province have not yet attained their full development. The coca from these districts is bought by two houses of Trujillo for the cocaine factories, of Lima, and as they enjoy a sort of monopoly, the prices vary at will. The proprietors of the haciendas of Huayobamba and Cayhanchal are proposing to establish cocaine factories in close proximity to their plantations, which may have the effect of lowering the prices. With the exception of the hacienda of Chuqui lanqui situated on the river of that name, all the other coca plantations are found along the river Chicama. To obtain the best results, coca should be cultivated in places where the temperature rarely falls below 24° Centigrade (75° Fahr.) and frequently rises as high as 30° (86° Fahr.) As regards the altitude of the plantations, those of Callancas and Huayobamba are for the most part situated at an elevation of 3 000 to 4,000 feet above the level of the sea; a few are found as high as 5,000 feet, but the product in these cases is of an inferior quality. The haciendas of Chuquillanqui, and a few others of minor importance, are situated at an altitude of about 2,000 feet. The quality of the coca varies according to the soil. That obtained from dry ground is better than the product of a moist soil. It is for this reason that the Chuquillanqui coca, although frequently attaining a height of about 9 feet, is far from possessing the strength and aroma of that produced in

Calancas and Huayobamba. In the districts of Pampas and Calancas, there are about 80 small proprietors of coca plantations; at Compin the number exceeds 100, while at Chuquilanqui there are hardly 20, the cultivation of coca having only within the last few years been introduced in the latter district.

The latest quotation for Coca leaves in London is only 7d to 8d per lb.

PLANTING IN JAVA: COFFEE.

Soerabaya is a "slummy"-looking place—narrow streets—lots of mud and the roads rutty and bumpy enough to shake the liver out of one! To the stranger passing along the streets two things are especially noticeable; first, the marked absence of Chinese (happy Soerabaya!) and secondly, the happy, contented and *intelligent* look of the natives of the place—from a cursory glance I should say a much superior type to the Javanese we get in the Straits. In Soerabaya I was given some coffee figures which fairly took my breath away. I have more to collect and will give the whole lot together. At present I am *currente calamo* and *currente jalana*! The country appears to be very thickly populated, the markets that we passed being crowded with women buying and selling; in some cases I should say there were over 2,000 present in one market. It is a quaint sight to see them riding along sitting astride their ponies, with a big pannier hung on either side. To show how these Javanese drivers rattle their ponies down hill, I give the following: From Prorong to Prigin took us three hours. The return journey was done in one hour and twenty minutes! The steep portion of the ascent was done in one hour and three quarters, with much whip-thong and bad language. The same on our return was done smiling in twenty-three minutes. Before I forget it the etiquette of calling in Soerabaya seems curious. The correct hour is from 7 to 8 p.m. and you have to give notice if you intend to visit for fear of finding the ladies in sarong and kabaya. This last was told me in a whisper, so please print accordingly.

The coffee in East Java is wonderful. As in other countries, there are failures; but the successes are marvellous beyond description. *All the coffee is grown under dadap shade*; and, where the soil has any inclination to stiffness, it is constantly worked up with changkol. The young coffee is very forward; but perhaps figures of actual results will be more interesting than the most glowing descriptions of appearance. One estate that I went over gives the following returns:—Total area 450 bouws. Age of coffee 12 years old to 2½ years old. All expenses, including the cost of the young coffee not yet in bearing, are paid: and the coffee has further given a clear profit of two hundred and fifty thousand rupees over and above the capital invested. Ye gods and little fishes! Let us pray that the Malay Peninsula may erupt heavily. The old saying is "It's money that makes the mare to go." I am sure that it's volcanic action that makes the coffee to grow. I am more or less sensitive about being called an Ananias; so I give the following figure taken from a Dutch Directory. The results are extraordinary, but I simply tell the tale as it was told to me. The appended table will, I am sure, be of interest to many a planter:—

TABLE OF RESULTS FROM SEVEN COFFEE ESTATES IN EAST JAVA.

Estates.	Elevation. ft.	Bouws.	Crop in Pikuls. 1884.	1885.	1886.	1887.	1888.	1889.	1890.
Limburg ..	1,200	600	1,705	500	2,041	5,342	6,160	5,700	1,200
Ayer Dingin ..	3,500	503	3,200	3,300	5,280	3,913	4,657	3,145	3,671
Pangadjaram ..	2,500	462	2,160	2,230	4,500	1,964	7,970	5,550	3,000
Minjin	3,000	500	1,600	3,108	4,150	1,656	5,620	532	3,531
Monorarie ..	3,500	650	3,900	4,300	1,500	3,600	2,430	2,200	1,000
Karang Nongko..	800	316	..	3,800	6,000	2,400	5,000	4,000	2,000
Kati Manis ..	2,000	550	6,000	3,350	6,000	1,600	8,000	3,100	530

Let any practical planter work out these figures, and he will find a very healthy average at the end of them. The estimate for Limburg this year is 11,000 piculs; and there is every reason to expect that it will be realised. I have seen no poor soil. All is very rich, and of volcanic formation. The strongest complaint, that I heard was that there was too much ash in it. Considering that the analysis of the coffee bean shows over 30 per cent of potash, ash must be indeed abundant to be a sense of complaint! The hospitality of East Java is unbounded.

The Java system of cultivation is thus: they work the *soil*, not the bush. But little is done to the bushes after topping, except taking off the suckers: but the soil is kept constantly worked up and open. Very little manuring is done: in fact one planter said to me: "If my coffee needed manure I should abandon it at once." I went over one estate that had just given ten piculs per bouw. The coffee looked well and in good heart, and able to be the same next year. . . . , . . Bawean is in regular communication with Java, and is only 8 or 10 hours' steam from Soerabaya. The climate of the hills is delightful: cool and bracing: and I think that, if Singaporeans realised that such a delightful little sanatarium as Prigin could be reached at such a cheap cost, more would avail themselves of it. I also heard much of a sanatarium at Tosari, 6,000 ft. elevation, but had no time to sample it myself. The country swarms with game. A few days ago a planter shot three tigers three nights running. You can scarcely go a hundred yards without finding pigtrack; and there is other game in abundance. Let no aspiring young planter wishing to better himself, or out of a berth, say to himself, "Here is a paradise for a coffee planter, I will go and try for a billet." Unless a man knows the Dutch language *and customs*, and at least one dialect of Javanese, he will have to begin at the foot of the ladder on a salary of something like sixty rupees a month. Preference is also given to a man who has lived for a time either in Holland itself, or in Netherlands Indies. The etiquette in Dutch officialdom is somewhat complex: and a planter is frequently brought into contact with the officials, both in regard to his land and other taxes, his labour, and in many cases his water-supply. These dealings require much tact and "a deal o' salutiu."—*Singapore Free Press.*

OOTACAMUND BOTANIC GARDENS AND PARK: ECONOMIC PRODUCTS.

As regards the Report itself, there is not much of local interest unless it be the figures showing how low is the rainfall of Ootacamund—*the average of 47 inches being exactly half that* of Nuwara Eliya:—

The average annual rainfall of Ootacamund is 47 inches. The rainfall for the year was 76·07 inches, or 23·15 inches more than was registered during 1894-95 and 29·07 inches more than the average. The heaviest rainfall was in June when 26·91 inches of rain fell on 24 days. The monsoon burst with unusual violence, but did no material damage beyond blowing down a large unsightly old tree of *Cupressus macrocarpa Hart.* and blowing a few branches off trees generally throughout the gardens. The fact that little damage was done is chiefly due to the sheltered position the gardens occupy in the Ootacamund valley. Of a few notes on Plants of Economic Interest, we quote the following:—

Ipecacuanha (*Cephælis Ipecacuanha, Rich*).—Very little interest seems to be taken in the cultivation of this plant, the powdered annulated roots of which form the *Ipecacuanha* of commerce.

Dandelion (*Taraxacum officinale, Wigg.*).—No indents for dandelion root were received during the year from any of the Medical Stores departments, and so the crop here has not yet been lifted. It can well be left growing for another year or longer without deteriorating in value.

Chiretta.—Messrs. Babannaya & Co., Mangalore, wrote for information regarding the "chiretta" plant in this Presidency. They were informed that the true "chiretta" plant (*Swertia Chirata, Buch.—Ham.*) is a native of the mountainous regions of Northern India and that it is not found in Southern India, but that a substitute for it (*Exacum bicolor, Roxb.*) appeared to be used in Ootacamund. The nature of their inquiry led the Curator to suspect that it was just possible that a substitute for the true species might be used here. He accordingly obtained two samples of the dried "chiretta" plant—one from the Ootacamund Bazaar and the other from the Ootacamund Hospital. Both proved upon examination to be identical, namely, *Exacum bicolor, Roxb.*—a native of the Deccan Peninsula. Although belonging to different genera' both species belong to the same natural order (Gentianaceæ), and, therefore, doubtless possess bitter tonic properties in common.

The Douglas Fir (*Pseudotsuga Douglasii, Carr.*).—The District Forest-officer, Nilgiris, forwarded a packet of seeds of this species with the request that they might be sown and, should they germinate, that he would like to have half the resultant seedlings, the other half to be kept for the gardens. The seeds were sown in two boxes on the 26th October 1896 and it has been interesting to watch the process of germination of the seeds of this conifer. A certain proportion of the seeds germinated in threo weeks, and the remainder have been germinating in succession, week after week, till the end of March: in other words, the process of germination has been going on in succession over a period of five months. The seedlings are only about 1 to 1½ inch in height at present, but they are in a perfectly healthy and promising condition. This species grows to a height of 150 to 200 feet, and forms immense forests in British Columbia and Oregon. Many of the precipitous slopes on the higher parts of the Nilgiris might be profitably planted with species belonging to the natural order Coniferæ.

COFFEE-GROWING AT CAIRNS, N. QUEENSLAND.

From the *Cairns Post* we reprint the following extracts from a private letter written by a well-known resident to a friend in England in reply to queries *re* coffee and sugar growing in the district:—"On the low-lying lands between the sea-coast and the foot of the Cairns ranges, the climate from about September to March is more or less damp and steamy, of course, perfectly suitable for tropical agriculture, such as sugar, which is fast becoming a very large industry. There is plenty of scope for sugar-planters; the soil is rich and well watered; rainfall very good; remaining months of the year are cool and pleasant. Ascending the range by railway, a sort of hilly tableland occurs, which extends inland, but which, for some miles around the vicinity of Kuranda and extending in each direction about parallel with the coast, is covered with dense tropical scrub. The soil is exceedingly rich in many places, and this portion of the tableland is from 1,100 to 1,600 feet above sea-level, and averages about six miles from the coast. This prevents frost in the cool months; and the sea breezes in the warm months, being above the influence of evaporation, are very cool and pleasant. The thermometer goes down to about 36 degrees in winter, and averages about 83 degrees in summer. Further inland again, at Atherton, about fifty miles from Cairns, lies an immense belt of agricultural country covered with very heavy scrub full of valuable timbers. The land about Atherton is about 2,500 feet above sea-level.

"Frosts occur in the cold months, and the climate with the exception of about three months out of the year, is probably as near perfection as it is possible to be. The soil about Atherton is generally considered to be amongst the richest in Australia. The rainfall is also good. The average rainfall at Cairns and on the adjoining ranges is about 80 to 100 inches per annum, well distributed. It is generally considered that along the top of the range or tableland, where the soil is good and no frost occurs, is the best place for growing coffee. There is no doubt, as has been proved, that at any rate up to about six years the coffee-trees grow exceptionally well and bear heavily when properly planted, but a lot yet remains to be proved before the industry can be called a perfect success, although enough has been proved to warrant anyone going in for it with an exceptionally good chance of success. With regard to labour, there is a moderate supply of Kanaka labour available, which is good labour. Wages are from £16 to £18 per annum and find them in food. Children (who pick well) are available to cope with it for some years to come. From the crops already picked, it is generally expected that, with 430 trees to the acre, about half a ton of dried beans to the acre may be relied on when the tree is five years old; the trees generally commence to bear when three years old, and the dried beans are worth about £90 per ton. The price of land is £4 per acre, varying in different localities. Anyone going in for coffee, by looking well around, might possibly pick up good bargains. The approximate cost of purchasing and preparing uncleared scrub land per acre for coffee would be about as follows:—

Purchase of land, say	£4
Clearing and burning off scrub ..	4
Grubbing up stumps	8
Digging holes for plants	5
Etc.	1
	£22

"To put, therefore, say 20 acres under coffee would cost approximately as follows:—

Purchase of land, preparing same and planting coffee, 20 acres at £22 per acre	440	0	0
Fencing, say	60	0	0
Dwelling-house, say	150	0	0
Farming implements and horses about	100	0	0
Cultivating plantation for say, three years until trees bear, allow	150	0	0
Contingencies, allow	50	0	0
	£950	0	0

"Add to this the cost of living, say, for three years. When trees are three years old you could expect a small return, which would increase to full returns when the trees are five years old. Half a ton of dried beans would be worth £45, and the profit per acre could be estimated at £20, according to present prices, which are considered lasting. That is: By an expenditure of, say, £950, and cost of living for three years, you should expect a return from 20 acres of coffee of about £400 per annum in five years from sowing the seed; allow about profit of £200 the fourth year. I may mention also that there are many other things that can be grown with more or less profit besides coffee and sugar, such as oranges, lemons, limes, citrons, mangoes, coconuts, bananas, maize, rice, ginger, pineapples, and many other things. Going further inland, there are immense tracts of rich mineral and pastoral country, producing gold, copper, tin, and silver, and carrying thousands of cattle. For anyone with a moderate amount of capital, and a fair stock of health and energy, especially young fellows with the best part of their lives before them, I think there are few better places than this for them to make a start and expect a good return for their outlay.

"It must be noted that the above approximate estimate of outlay and profit refers to men who are not used to manual labour themselves, and would

have to employ all the labour required. Of course, any man used to manual labour, or if married, or if he has children, could do, say with the help of a few kanakas, all the necessary work, and could put smaller areas under coffee at a much less outlay, and expect a larger profit per acre. This would apply in particular to married men with families."—*Queensland Agricultural Journal for July.*

COST OF LIVING ON S. INDIA PLANTATIONS.

Sir,—Absurd stress has been laid on my omission of the dhoby's charges. He costs me exactly four rupees for three washes a month, as from long experience I have found that to insist on the weekly wash is to attempt the impossible. Instead of that, I merely have to lay in a larger stock of clothes. *Not* out of the 50 rupees a month, mind you, for I distinctly stated that clothes wern't to be got out of this sum at all. My bill of fare runs somewhat as follows, as it may interest your indignant correspondent to know the composition of the "last straw":—

Chota Hazri.—Porridge, a chop or steak, bread and butter and jam (home-made), and tea or coffee.

Breakfast.—Rissoles, or chop, or joint. Curry and rice. Bread and butter and cheese.

Tiffin or Tea.—Bread and butter, jam and cake, also cold meat if joint is on cut.

Dinner.—Soup, joint or made-dish, curry and rice and bread and butter and cheese or plain pudding.

As for drinks, an occasional peg.

My bazaar bill *now* costs me (for meat, rice, fruit groceries) R3 8, or say R16 per month. Soap, butter, jam, bread, tea or coffee, milk, &c., R10 per month. Liquor and smokes, R15. Dhoby, R4. Boy, R15. Total R60. Add, R15, for estate clothes and boots, you arrive at my R75 per mensem, which I estimated would keep a young planter very comfortably. Personally, I think that R100 is the lowest one should offer a European of over 18 months' experience in planting. But as a beginning, R75 should not be sneezed at, especially if yearly additions are promised —if work is satisfactory—of R25 per mensem.

By the way, a "Planter's Wife" gave some excellent directions some time back how a young planter should be able to keep a respectable and comfortable house on R100 a month or so. While R100 is better than R75, and R75 than R50, no man need starve or even stint himself if he has R50 a month to his name." EX-CREEPER.

—*Planting Opinion*, Aug. 7.

COFFEE PLANTING IN SOUTHERN INDIA: MEETING OF THE UNITED PLANTERS' ASSOCIATION.

At a recent meeting of the United Planters' Association of South India an able, interesting, and important discussion took place on the subject of "scientific investigation" into diseases affecting coffee, divided into two parts, one being leaf disease and the other scale pests. The discussion on leaf disease was opened by Mr. J. A. Harris who said (after reading Ceylon literature on the subject) he had reluctantly come to the conclusion that further investigation by an expert as to *Hemileia Vastratrix* would not be likely to add much to what was already known. He was inclined to the belief that, since the disease was not constitutional, but external, attacking only the leaves, a cure of a permanent nature was not likely to be discovered; and that they should turn their attention, as intimated both by Mr. Marshall Ward and Dr. Trimen to maintaining their trees in such strong vitality as would enable them to resist the attacks of this pest. As to how this might best be done he referred to careful cultivation and judicious manuring. With regard to the former he emphasized the soundness of Mr. Marshall Ward's opinion that they should aim at making the plants grow leaves during the time that the disease was least likely to be propagated and avoid the growth of young and succulent wool when the spores are most blown about,—with the object of having the trees at the time of visitations covered with matured leaves both able to resist the disease and of having them as far as possible free from young ones on which the spores germinate with great rapidity. It was rather curious to notice that in Ceylon the worst attacks of Hemileia Vastratix were usually in the S.-W. Monsoon, during the months of June, July and August, whereas in Mysore, and he believed in other parts, the worst visitations came in September, October and November, and sometimes extended over January and February. Moisture, heat and air being necessary for the spores, he presumed that the damp chill of the S.-W. Monsoon checked it. With reference to digging he considered it was a moot point whether deep cultivation checked the disease, the tendency nowadays being to avoid stirring up the soil more than necessary. As to manure he considered September as far as Mysore was concerned a better month than August for applying manure. Applications however, must be greatly influenced by the supply of labour. As to what manures they should apply he said that in this matter the planting industry of Southern India required the services of an Agricultural Chemist, his arguments in favour of getting a thoroughly competent man from home being that the mechanical conditions of a sample of soil sent home must undergo change in transit, and that a man on the spot would be in a position to observe the organic condition of the soil which would enable him to give a more accurate and valuable report. He concluded by moving "that this Association is of opinion that the time has arrived when the services of an Agricultural Chemist are essential to the future welfare of the Planting Industry in Southern India." Mr. E. G. Windle seconded Mr. Harris's Resolution. A discussion ensued which was taken part in by Messrs. O. Scott Skirving, Leeming, Parsons, Hay, Hodgson and Hockin and on the meeting going into Committee the following resolution was adopted:—"That a Sub-Committee be formed to consider the various proposals put forward, and to advise as to the result in general meeting and that for this purpose Messrs. Harris, Windle, Acworth, Parsons, Hocken, and Leeming do form the Sub-Committee."

The discussion on scale pests was opened by the Hon. Mr. Hodgson who said that a Government Order had been issued which was very satisfactory. It said that Government was desirous of seeing an entomologist appointed at an early date, and had already communicated with the Government of India as to the best means of obtaining one. That showed that the Madras Government had taken a great interest in this subject and he could speak himself of this being the case. This scale pest was increasing rapidly, and in Districts in which it existed it was almost as serious a matter as leaf disease was in the Districts where that existed, and everything should be done to eradicate it. Mr. H. O. Newport supported Mr. Hodgson's remarks in a speech in which he referred to various methods of dealing with the bug. He obtained a spray solution from the Chiswick Soap Company called "Spinno," and sprayed this evil

smelling liquid on to the trees with matter in proportion of 100 parts to 1 as directed by the Soap Company. This had no effect whatever; in fact the bug seemed to fatten on it! Stronger solutions had better results but even then he never succeeded in killing out at the scale on any one branch or leaf. He also tried a mixture of kerosene and soft soap in water in various proportions—also an infusion of quassia bark. Also mixtures containing in various proportions, turpentine, tobacco decoction, sulpher, lime, etc. Some of these seemed to have temporary slight effects but none did any lasting good. The conclusion he had arrived at was that lady birds would be not only the easiest and most effective way of getting rid of scales, but the only possible way of doing so. He suggested that the Government of Madras should communicate with Mr. E. E. Green (Ceylon) on the subject and ask him if he would be willing to come over and undertake the working out of this matter on the lines of the experiments so successfully made in Hawaii. The following resolution proposed by Mr. Acworth was adopted:—"That a small Sub-Committee be appointed to decide upon an amount to be taken from the Reserve Fund to be added to any sum raised by the Lower Pulneys and other Associations for the purpose of immediately introducing the Lady Birds." Other resolutions adopted were:—"That the Secretary be instructed to forward copies of the correspondence on this subject to the Secretary of the Indian Tea Association, Calcutta, with a view to obtaining the support of that Association in the matter of the employment of an entomologist and the subsequent introduction of the national enemies of the various insect pests inimical to tea and coffee." "That this Association would wish to record its thanks to H.E. the Governor and the Government of Fort St. George for the active interest he has taken in the sbject of the introduction of lady birds and other natural enemies of the insect pests to which tea and coffee are subject, and for the promise of practical help as conveyed in the G. O., No. 634, of the 27th July 1897." "That if the necessary support can be obtained from planters and the firms engaged in the manure trade, the U. P. A. S. I. engage to subsidise a suitable Agricultural Chemist for the purpose of analysing manures, soils, etc., by a standard method and advising on all points of planting chemistry." "That this matter be enquired into by the Sub-Committee appointed to consider the question of leaf disease, and if it is resolved that an expert shall be employed, that the Sub-Committee do also suggest what sum should be allotted from the Reserve Fund in aid of that purpose."

It is clear from the whole of the discussion that with both leaf disease and green bug to contend with, the end of coffee in India (as in Ceylon) is approaching unless lady birds can be introduced to stop the latter.

INDIA-RUBBER FORESTS IN MANY LANDS.

MAJOR KERBEY'S SOUTH AMERICAN TOUR

Letters have reached the India-Rubber World lately from Major Joseph Orton Kerbey, dated at Mollendo, Peru, whence he purposed starting overland through the rubber districts of Peru and Bolivia, expecting to reach Para via the Amazon during September. In his report Consul Kerbey declared his belief in the practicability of intoducing the Para rubber-tree into southern Florida, and his present mission to South America—the second since his official residence in Para—is based primarily upon plans in that direction, though he is also looking for ethnological and other specimens for museums. Major Kerbey left New York on the "Lucania" on January 16. From England he sailed for South America touching at Pernambuco on March 4 and later at Buenos Aires, whence he travelled by rail and on mules to the Pacific coast. On May 20 he reached Mollendo, the starting-point of a railway to Lake Titicaca, beyond which several land and water routes may be followed to as many important rubber districts. At Buenos Aires the government expressed considerable interest in Major Kerbey's journey and offered to send him to the *gran chaco*, adjoining the Brazilian state of Matto Grosso, to report on the practicability of cultivating rubber there. He declined this, but when he left there was talk of organizing a rubber-exploitation company at Buenos Aires.

"We propose," Major Kerbey writes, "to start a nursery in south Florida, capitalized at $100,000, to propagate plants of India-rubber, cocoa, vanilla, and orchids. We want to sell plants of rubber of different sorts to companies to be formed for cultivating them in Florida, the isthmus of Tehuantepec, Central America, etc. When I get back, with 100,000 genuine rubber nuts in my possession, I know the land is ready and the money in hand to germinate them in our nursery. If you print anything about it, say that this nursery is established at Orlando, Fla., and Professor O. F. Winkleman will give information. Some rubber seed have already been sent there."

PERUVIAN SOLDIERS GATHERING RUBBER.

In an article on the revolution last summer in the rubber district of eastern Peru, Richard Payer, writing from Iquitos,* makes a note of interest on the way in which the force of rubber-gatherers is recruited incidentally in that sparsely-settled country. Writing of the soldiers brought across the Andes from the coast districts to suppress the rebellion, Herr Payer says: How long the troops will feel at home in this tropical climate is difficult to say; at all events it would be unprofitable for the Government to transport them back over the mountains. As in the past, doubtless most of these defenders of their country who have undertaken the expedition into the unhospitable forests of eastern Peru with adventurons expectations will remain to become peaceful rubber-gatherers. They will discard their swords for rubber-paddles, and over the smoke of their camp-fires turn the milk of the rubber-tree into a merchantable product. At the present advanced prices, it requires little effort to make a rubber ball, which, at the weight of 120 kilograms, is worth 1000 francs in gold. Such a ball, while the present abundant supply of milk lasts, can be gathered by a family consisting of two or three persons in eight days; the children are especially adapted for this work on account of their agility. Thus material progress, healing all wounds, converts many an evil into good, and the rubber-men of eastern Peru will soon have regained the losses sustained through the war, the increased population enlarging the production. Rubber is, and will remain, the best paymaster, and North America, for export and import alike, affords the best market. There is a condition of solvency of the business world here which denotes that commerce is blooming anew from the ruins of the revolution.

ANOTHER OUTLET FOR BOLIVIAN RUBBER.

An enterprise under way in South America, backed by New York capital, but about which little has yet appeared in print, is thus referred to in the Panama *Star and Herald*:—According to *El Economista* (Lima), the firm of Ballivian & Co. has completed two-thirds of the road around the rapids of the river Madeira between Brazil and Bolivia, and will open the route to traffic January 1, 1897. This is only a cart-road with a total length of 112 miles, but it is of great importance. The disastrous attempt of Colonel George

* In *Petermann's Mitteilungen*, XLIII (1897), 43-45.

Earl Church to build a railroad around these rapids from San Antonio, on the Madeira, to navigable water on the river Mamore in Bolivia, is well known. But the natural trade route into the rich regions of eastern Peru lies that way, and the desire to open it up is irrepressible. It is stated that Ballivian & Co. are backed by the Para house of R. F. Sears & Co., whose intention is to stimulate trade by this cart-road with a view to the construction later on of a railroad, with further extensions towards Cuyaba in the Brazilian state of Matto Grosso, thus drawing the trade of that region also, which now goes down the river Paraguay to La Plata ports, in the other directions via the Amazon and Praa to United States and European markets.

The river Madeira forms the only water outlet for

THE REPUBLIC OF BOLIVIA,

with a larger area than any European state save Russia. Into the Maderia flow streams which form a great system of waterways, draining every corner of Bolivia, and all those rivers are lined with rubber trees. It was not until 1880 that the first shipment of rubber from Bolivia was made, but in a single year recenly 1,600,000 pounds of the finest rubber in the world, commanding the highest prices, have been floated down her rivers, into the Amazon, and out upon the Atlantic at Pará. This rate of progress will not seem insignificant when it is remembered that, owing to dangerous cataracts in the Maderia, scattered over long distance, a cargo of Bolivian rubber is sometimes three months on the way to the seahoard, at a cost of transportation of 25 cents per pound, to say nothing of what is lost through the capsizing of boats. In the belief that transportation in cattle carts will be cheaper and occupy less time, the road referred to has been opened. Cattle are as plentiful in Bolivia as rubber is, and, at present, cost practically nothing. With the development of trade which is expected to follow the opening of this new outlet for rubber and cattle the *concessionaires* believe that capital will be forthcoming for a railway to replace the cattle trail. To-day the predominant idea in Bolivian national life is the development of the state by making her resources available, and the resonre first considered invariably is rubber. The concession referred to above is held by a company headed by Sr. Adolfo Ballivian, who for some time past has controlled important contracts with the Government. The interest of Mr. Sears in the matter had its beginning a year ago or more, and he is confident of an important development in due time. The preceding has been in type for some time past, and is now printed without revision for the reason that the cart-road has not yet been completed. This has been retarded, the Indian Rubber World is informed by Mr. Sears, who is now in New York, by the fact that the laborers have been so largely utilized in gathering rubber. It is expected, however, that the road will be opened before the coming transportation season is ended. Since whatever rubber is produced hereafter on the Beni or in Bolivia will naturally come over this road, a very material saving in transportation charges is anticipated.

The newspaper *El Economista* reports that the

EXPORT OF INDIA-RUBBER

via Villa Bella in 1895 reached 1,712,544 pounds, of which 1,545,412 pounds were "fine" and 167,132 pounds "sernamby," or coarse. The greater amount of this was the product of Brazil and the remainder of the Brazilian country drained by the Mamore. A British consul in Bolivia, Mr. Alfred St. John, estimates the annual production of Bolivian rubber at 850 tons, provided that none is smuggled out of the country. There is an export duty of one boliviano per arroba of 25 pounds, with a duty one-half as large on coarse rubber.—*India Rubber World*, July 10.

THE MOVEMENTS OF COFFEE.

The trade coffee year, which closed June 30, has passed into history with a record of large supplies; increasing stocks; unusual advance in deliveries; heavy decline in prices, amounting to 5⅝ cents per pound for No. 7 Rio. From 1887 to 1896 was a period of high prices, during which production was stimulated in Mexico, and Central and South America. The usual yearly gain in consumption was checked. The deliveries as will be noted from the table below varied slightly from the yearly average of 643,270 tons (or 10,935,595 bags) for the five years 1891-92 to an including 1895-96. During the year 1896 97 they reached the highest point on record in the United States, or 5,088,594 bags; in Europe, 7,155,610; total for two countries 12,244,204 bags, making the banner year for the coffee industry.

Present indications point to an era of low-cost coffee and steadily increasing consumption, due primarily to low prices, and, secondly, to the development of the coffee roasting indnry and to the stimulus to demand, resulting from vigorons efforts to push the sale of package coffee. The bulk of the coffee consumed is of medium and low grade, used extensively in sections which formerly bought the raw bean, which was roasted as desired by the consumers, who have discovered that package coffee is of uniform quality, while its use saves time and trouble.

The total deliveries of all kinds of coffee in 1896-97 compare with deliveries of five preceding years as follows:—

EUROPE AND UNITED STATES.

Year.			Bags.
1896-97	..	..	12,244,204
1895-98	...	..	11,142,813
1894-95	..	..	11,212,851
1893-94	..	..	10,571,533
1892-93	..	..	10,946,228
1891-92	..	...	10,804,551
Total, six years ..			66,922,180
Yearly average (656,099 tons)			11,153,697

The deliveries in Europe in 1896-97 show a gain over 1895-96 of 351,925 bags, or 5.17 per cent. They compare with the five preceding years as follows:—

DELIVERIES IN EUROPE.

Year.			Bags.
1896-97	..	..	7,155,610
1895-96	..	..	6,803,685
1894-95	..	..	6,820,905
1893-94	..	..	6,272,688
1892-93	..	..	6,547,679
1891-92	..	..	6,392,719
Total, six years		..	39,993,286
Yearly average (392,091 tons)			6,665,548

The United States consume more coffee than any other country in the world in the aggregate, but its use per capita is far below Belgium, Holland and Denmark. The deliveries in 1896-97 compare with five previous years as follows:—

DELIVERIES IN UNITED STATES.

Year.			Bags.
1896-97	..	..	5,088,594
1895-96	..	..	4,339,128
1894-95	..	..	4,395,946
1893-94	..	..	4,298,840
1892-93	..	..	4,398,549
1891-92	..	..	4,411,832
Total, six years		..	26,932,889
Yearly average (264,048 tons)			4,488,814

THE SUPPLY.

Brazil is the colossal producer and the dominant factor in the markets of the world. In 1896-97 that republic furnished 70.89 per cent. of the total

arrivals of coffee in Europe and the United States, and 77.09 per cent. of the arrivals in the United States:—

The exports from Rio and Santos for the year ending June 30th, 1897, compare with the preceding seven years as follows:—

		To. U. States. Bags.	To Europe Bags.	Total Exports. Bags.
1896-97	Rio, Vic., etc.	2,616,000	1,084,000	8,634,000
	Santos	1,565,000	3,369,000	
1895-96	Rio and Vic.	1.746,000	899,000	5,762,000
	Santos	1,050,000	2,067,000	
1894-95	Rio	1,816,000	687,000	6,401,000
	Santos	1,347,000	2,551,000	
1893-94	Rio	1,641,000	606,000	4,016,000
	Santos	797,000	972,000	
1892-93	Rio	1,972,000	953,000	6,295,000
	Santos	1,102,000	2,268,000	
1891-92	Rio	2,556,000	1,148,000	7,267,000
	Santos	997,000	2,556,000	
1890-91	Rio	1,556,000	750,000	5,537,000
	Santos	798,000	2,253,000	
1889-90	Rio	1,767,000	724,000	4,570,000
	Santos	512,000	1,567,000	

It is a matter of interest to note the irregularity of the Brazilian crop. In 1890 91 there was an export of 7,267,000 bags; two years later, of 4,016,000 bags. If two heavy crop years, such as 1896-97 and 1897-98 (as now estimated), are succeeded by a light crop, as is not improbable, we may anticipate a sudden marked rise in cost. Nature is not a confirmed prodigal.

STOCKS.

The total stock of all kinds in the United States July 1, 1896, was 375,113 bags; July 1, 1897, 676,856 bags—an increase of 301,743 bags. Stocks of coffee in Europe July 1, 1896, 1,569,080 bags; July 1, 1897, 2,332,024 bags, a gain of 762,944 bags.

The total visible supply of the world, as reported by the New York Coffee Exchange July 1, 1897 was 3,975,880 bags, against 2,588,193 bags July 1, 1896, an increase of 1,387,687 bags.

The gain in supply will fully offset the estimated reduction in the Brazil crop of 1897-98, while the probable increase in other countries will result in a world's supply this year more than equal to requirements of 13,500,000 bags as follows:—

Visible supply, July 1, 1897 ..	3,975,880
Brazil crop, 1897-98 ..	7,000,000
Other crops	4,800,000
Total estimated supply 1897-98 ..	15,775,880

—*American Grocer*, July 14.

THE MADRAS GOVERNMENT CINCHONA PLANTATIONS.

The late Mr. M. A. Lawson, who for twelve years had controlled the Cinchona Plantations of the Madras Government on the Nilgiris, died early in 1896, and Mr. W. M. Standen, a planter of some sixteen years' experience and of established reputation was appointed to succeed him. It is an open secret that this appointment, though passed in Calcutta, did not find favour at the India Office. The Secretary of State, preferring doubtless that he should select an officer as he had selected the late Mr. Lawson, withheld his sanction and in the euphemistic phrase of the Madras Government, the matter "was under correspondence" during the year. Finally the authorities in London gave way and agreed to the Madras Government's nominee holding office, at least on a five years' trial. It must, therefore, be a considerable source of satisfaction to the Government to find, as appears from the Annual Report on the Cinchona Plantations during 1896-97, that the results of that year's working under Mr Standen's control have been so satisfactory as fully to justify its selection. During the twelve years of the late Mr. Lawson's control, the revenue of the Department only twice exceeded the expenditure, and then only by a sum of about R1,500. In the year 1896-97, on the other hand, a surplus of R69,000 has been shown, the expenditure being reduced while the receipts were R42,000 more than in the previous year. The Government, never very lavish of praise, remarks that "the administration of the Department must, in these circumstances, be considered to have been eminently successful."

The remarkable improvement in the results of the Government's Cinchona enterprise during 1896-97 appears to have been due to a very simple cause. The quantity of bark used in that year was practically the same as was used in the previous year, 238,000 lb. as compared with 234,000 lb. But the quantity of drugs extracted has risen from 5,900 lbs. to 11,241 lbs., or by very nearly cent. per cent. The percentage of the yield of quinine to bark was 3·3 as against 1·5 in the previous year, or more than double; and the effect has been to turn the operations, which for years had been conducted at a loss, into a very paying concern. The increased yield from the same quantity of bark was, of course, due to the more thorough extraction of the alkaloids * and it certainly does not say much for the efficiency of the previous régime that it was left for Mr. Standen to discover this. The other results of the working of the Cinchona Department in 1894-97 appear to have been equally good. The quantity of quinine manufactured and the quantity sold during the year were the highest on record. The sales of the drug are now mainly conducted through the Post Office. The quinine is made up in five-grain powders and there are 1,550 Post Offices in the Presidency where these are kept. The idea is to bring the alkaloid to the doors of the people and to supply it at cost price and in small quantities. Apparently this plan is likely to succeed, for though it was only started in July, 1895, 4,180 packets were sold in 1896 97 as compared with 664 packets in the preceding year. As the diffusion of the use of quinine among the native population can hardly be other than beneficial, this aspect of Government's enterprise in cinchona can be entirely applauded. If the whole output of the Government plantations is thus utilized, most of the objections to the growing of cinchona by the State will be met, for the system of Post Office distribution reaches a public which, otherwise, would never use the drug at all. The most difficult thing to ascertain from an Annual Report such as that under notice is the actual state of the plantations; and this is doubtless the real crux of the management. It is stated, however, that there were 31,500 more trees at the end of the year than at the beginning and that a new system of transplanting seedlings was introduced which is expected largely to reduce casualties. As the good financial results were produced without any increase in the amount of bark consumed, there is no reason to suppose that the plantations were overcut, and the general impression left by the Report is a highly favourable one.—*M. Mail*, Aug. 20.

NEW AREAS OF CULTIVATION IN PUTTALAM DISTRICT.

There was no marked progress in this respect. Capitalists are on the lookout for land for coconut cultivation in the south of the district, but up to the end of the year no land had been set free for sale. There are very extensive tracts of suitable land, but the equally extensive projects of the Forest Department in the matter of forest reserves tied up all this land. The limitation of these proposals within reasonable bounds was awaiting decision, which was expected early in 1897, when it may be hoped that some suitable land may become available for sale. About 35 more acres were opened under Maha Uswewa, the largest tank in the district.—*Mr. G. A. Baumgartner's Report for 1896.*

* And the greater age of the bark.—Ed. *T.A.*

CEYLON EXPORT TRADE IN COCONUT OIL.

Our Export of Coconut Oil to the United Kingdom and the Continent of Europe has been reduced, it is believed, owing to its great abundance in these markets, and consequent low prices; and, relatively to Coconut Oil, the cheap cost of Tallow during the last few years, and also of Cotton-seed Oil, both ot which can be used instead of Coconut Oil for many purposes, although a certain quantity of Coconut Oil must be employed with them to obtain the best results in soap and certain other manufactures.

With regard to America, it is believed that, in addition to the above causes, the Silver troubles of the United States have had much to do with the falling-off in our Export of Coconut Oil to that Continent.

Up to the middle of 1894 there had been a gradual increase of our Export of Coconut Oil to India; but the Import Duty of 5% *ad valorem*, which was placed on all Imports into India about March 1894, had the effect of practically putting an end to the trade in our Oil, as it handicapped us to the extent of R17 or R18 per ton as against Cochin Oil which, of course, is not subject to the Import Duty.

About two years ago drought in Cochin caused Coconut Oil there to rise in price, and to such an extent that it again began to be possible to ship Ceylon Oil to India with advantage, and our Oil being much cheaper to lay down than Cochin Oil, and the facilities of shipment from here being very great, this trade has continued until now to expand to quite a remarkable extent, as the following figures will show, viz :—

EXPORT OF COCONUT OIL FROM CEYLON TO INDIA.

	Tons.		Tons.
1890 ..	4,946	1894 ..	1,115
1891 ..	5,346	1895 ...	737
1892 ..	5,810	1896 ..	4,339
1893 ..	5,734		

And for the $7\frac{1}{2}$ months of 1897 to 17th August, the Export has been 4,087 tons against 1,997 tons for the same $7\frac{1}{2}$ months last year.

In India the Oil is used for burning and other domestic purposes only, and not in manufactures, and it has not to compete with Tallow and Cotton-seed Oil, &c., as in Europe and America. Cochin Oil continues to be much dearer than Ceylon Oil, and as the consumption in India seems to be capable of great expansion, it appears as if the Export for this year, 1897, might reach the unprecedented total of between 7,000 and 8,000 tons.

MANURING OF TEA.—An Estate proprietor writes:—"There is one thing in Ceylon not half attended to and that is when applying manure either artificial or bulk, to be careful not to let the coolies cut the roots of the tea, the main side roots I mean. I have seen a lot of careless work done in this respect. The tree will expend its energy in making fresh roots using up the manure in the attempt, instead of its going to strengthen the whole tree, and make it flush more freely. For this work mamoties should be forbidden, and forks or a blunted short scraper used. I think it folly manuring tea too when old coffee stumps with feeding rootlets are allowed to remain in the land. These should all be removed if manuring is to be done."

"SOOTY MOLD ON ORANGE TREES" —LESSONS FOR TEA PLANTERS.

Mr. E. E. Green writes from Eton, Pundaluoya, on the 20th August, as follows :—

Thanks for the paper (Bulletin No. 13, U. S, Department of Agriculture) on the "Sooty Mold of the Orange and its Treatment." It has a certain amount of interest to us—as it deals with the black fungus that follows an attack of "bug," and its effect upon the plant. The following points may be noticed :—

1. The author confirms other observers in the opinion that the fungus is quite superficial, vegetating solely on the "honeydew" excreted by the insects.

2. Injury is however found to occur through interference with the process phytosyntax (the elaboration of carbon compounds under the influence of light). This fact has been demonstrated by Büsgen :—"He removed the fungous membrane from a small portion of a leaf and exposed the leaf to the sun. In the evening, after a sunny day, the leaf was plucked and the chlorophyll extracted with alcohol. After this the leaf was treated with iodine, and the parts from which the membrane had been removed in every case stained a dense blue, indicating the formation of an abundance of starch, while the surrounding portions of the leaf which were protected from the sun by the fungous membrane, remained entirely uncoloured, showing that no starch was formed." This has a direct bearing upon the practice of growing tea under old coffee. When the latter is infected with "scalebug," the "honeydew" and accompanying sooty fungus will be communicated to the tea leaves below, and though not actually penetrating their tissues, will interfere with their proper function.

The author includes "blighted and shrivelled leaves, and small and dry fruit" in his account of injury due to "sooty mold." But the larger part of this effect is surely attributable to the attacks of the insects that precede the fungus.

In treating of remedial measures also, the author writes as if the "sooty mold" were the main disease, instead of being one of the consequences of a more serious malady. He evidently understands the facts himself, as his proposed remedies are insecticides and directed against the insects; but the case might have been made more clear to the general reader. Such expressions as,—"the treatment of sooty mold by fumigation with hydrocyanic gas"—"kerosene emulsion, which has been recommended for sooty mold"—"resin wash for sooty mold," &c., &c. —are most misleading.

THE AMHERSTIA NOBILIS.—We see an "Enquiring Globe-trotter" writing to a contemporary to ask if the *Amherstia nobilis* is indigenous to Ceylon. No, of course, it is not. It was introduced from Burma to Ceylon. *The Treasury of Botany* refers to it as follows :—

Amherstia.—A genus of the Pea family (*Leguminosæ*) named in honour of the countess Amherst. *A. nobilis* is the only species. It grows near Martaban, in the Malayan peninsula, and attains a height of about forty feet. When in flower, it is said to be 'one of the most superb objects imaginable, unrivalled in India or in any other part of the world.' The leaves are equally pinnate, large, and, when young, of a pale purple colour. 'The flowers are large, scentless, and of a bright vermilion colour diversified with three yellow spots and disposed in gigantic ovate pendulous bunches.' The tree is cultivated in some of the larger English gardens; but, requiring so much space, is seldom met with in collections. The Burmese name of the plant is *Thoca*, and handfuls of the flowers are offered before the images of Buddha.

HOW TO ECONOMISE THE AVAILABLE LABOUR SUPPLY ON OUR TEA PLANTATIONS."

We have just been going over the answers received to our Circular on the above subject. They number between three and four score in all, and some of the more experienced and practical planters in the country are among our contributors, as well as not a few who are known as among the more energetic and interested of the younger generation of planters. We have also one or two contributors from among our local Engineers, these having been invited to say what machinery, inventions or arrangements they would recommend to the notice of our tea-planters as means of economising Cooly Labour. We feel sure, therefore, that the Correspondence will be regarded with considerable attention by Proprietors, Agents and Superintendents, more especially at a time when "economy" is in the air,—the one policy which we hear on every side, as requisite to counteract the effect of low prices and low exchange. It will be remembered that our "questions" covered a good deal of ground, including Estate Tramways, Wire Shoots and other similar labour-saving appliances in field or factory. Then, certain remarks were made about "Weeding" and "Draining" and the cultivation of crops to dig into the soil; while finally certain questions were preferred as to the best means of attracting and keeping coolies on estates, and of saving them from current temptations, or falling into the hands of crimps. Young planters cannot fail to benefit by what their seniors have to say on many of these topics, and still more by suggestions which, though they may not be practically adopted, or even suitable for adoption in all cases; yet are invaluable, because of making young men *think* for themselves on points connected with their planting profession which, perhaps, have not hitherto come specially under their notice. It seems to be generally agreed that the younger generation of planters (as a whole—of course there are exceptions) do not secure the confidence of the coolies to the same extent as their predecessors. "How do you manage to have always as many coolies as you want and on such moderate advances?"—was our question the other day to a manager, not a hundred miles from Dikoya district, and his answer was suggestive as to the great value the average cooly attached to the "master" who listened to his little complaints, quarrels and grievances, and generally treated his labourers as so many children in respect of their dependence on himself in their troubles. As an ex-coffee manager puts the case for the "days of old":—

Ramasamy, Menatchy and little Soondurum, used to get their Castor oil, Quinine, Dover's powder and Turpentine at the hands of their Durais and they—master and labourer—were in touch. Now all that is changed. The Head of the Medical Department gets Knighted, a few coolies may be saved when attacked by some disease that requires special medical care; but hundreds of men, women, and children die of diseases because such were not taken in time, and because the simple dose of Castor oil, Quinine and Dover's powder administered by the Factory Manager becomes obsolete, through these armies of Dispensers and Medical Assistants being let loose on plantations.

Then, as to labour-saving contrivances, have we not in many parts of Ceylon, to learn something from our neighbours in Northern India? For instance, the Chairman at the London meeting of the Jokai (Assam) Tea Company, two months ago, mentioned among other things,—

For years we have been extending our cultivation, replanting old inferior China fields with indigenous plants, thus doubling their value, replacing temporary buildings with permanent ones, improving the accommodation for our coolies, providing good water and laying down light railways and tramways in order to economise labour. We have now about 30 miles of railway and tramway on our estates. A large share of the cost of these improvements has in former years been charged to block; but revenue bore a considerable share of it. On this occasion we have charged the entire cost to revenue. Notwithstanding this we have the satisfaction of being able, after paying the usual 10 per cent. dividend, to add £1,191 to the reserve fund, and to carry forward £987. My colleague, Mr. Lawrie, has lately raised an important question as to the proper method of making up the accounts of a tea company so as to do full justice to the present shareholders, and at the same time to keep the necessary guarantees for stability and security, which are of fundamental importance. Mr. Lawrie proposes that instead of debiting revenue with the cost of maintaining new cultivation on a variable area, no year's revenue should bear the cost of maintaining an area of young tea exceeding 5 per cent. of the mature plant. I think that the proportion suggested would be fully ample to provide for any probable depreciation in the plant. We have still to spend a good deal of money to bring some of our gardens up to the standard of equipment I would like, but taking them as a whole, they will, when the improvements now in progress are completed, compare not unfavourably with any other estates I have seen. * * *

The report expresses some apprehension that, owing to the large number of coolies we have lately imported, taking advantage of the large emigration caused by the famine, we may have more labour than we actually need. I have no fear on this head. The tea plant responds gratefully to good cultivation; an extra hoeing never fails to give an ample return in the quantity and quality of the crop. But besides this safety valve, we have decided to plant a fine tract of about 300 acres which lies on our own railway between Panitola and Kampti-Gwali Gardens, and 100 acres on our Tippuk estate, which is almost all held in fee simple. The abundant supply of labour may enable us to go on somewhat more expeditiously with this work than we would have done otherwise.

Every proprietor is interested in what may be done to conserve the health of coolies, to keep them up to the full working strength, and in all that may save them unnecessary labour. How can coolies in the present day care to abide on plantations which require the carriage of tea chests or even rice-bags for more than a mile, or two or three miles, on their heads or backs? Other things being equal, such estates must suffer a great disadvantage and surely the proprietor who does everything in his power to make work easy for his coolies, to make their lives comfortable and absolutely healthy with an ample supply of good water, must score. We are accustomed to boast of our progress on Ceylon plantations; but where are we to find even on the largest or best equipped in the island, "30 miles of railway or tramway" to expedite carriage? No doubt, on the flat and extensive Assam estates, the facilities for laying rails are much greater; but still, a good deal should be done here in this way, and in establishing wireshoots, to relieve the coolies of work they do not like, and to make the working of certain estates more economical.

How to Economise the Available Labour Supply.

QUESTIONS.

IN OUR CIRCULAR TO PLANTERS AND ENGINEERS.

(1.) Have you had any experience of Wire Shoots, or seeing their working, and do you think them applicable much more freely then at present on estates? Do they damage tea leaf?

(2.) Particulars of any other Labour-saving appliances in field or factory of which you have had experience, or have noted among your neighbours?

(3.) Could small Tramways 18-in. or 12-in. gauge be applied profitably on average estates to save transport coolies?

(4.) On Weeding. Has it ever struck you that weeding (both of coffee and tea) was overdone in Ceylon?

(5.) With reference to saving Labour as well as saving soil, would you advise an experiment in less frequent weeding, or in what may be called, selected weeding—that is the leaving of mosses, selaginellas, small ferns, and other such small plants?

(6.) Have you ever tried as experiment in cultivating any crop (of lupines, clovers—N.B., not the *Oxalis*, a common and obnoxious weed like a trefoil—) to be dug into the soil, or would you advise such an experiment?

(7.) Is the present system of Drainage satisfactory? Could any partical means be devised for trapping or retaining the vast amount of soil that is annually carried away with the surface water? A favourable account has reached us of the result of planting rows of cuscus grass (which neither seeds nor spreads) above the drains—these grew close and strong, forming a barrier against soil being washed down, while allowing the rain to pass through.

(8.) Kindly mention any means in other directions in connection with the usual plantation work where Labour might be saved?

Next as to keeping Labour, would you

(9.) Suggest any special perquisites to coolies—is the giving or ground for gardens to each lines generally observed—and where not, would it not make them more contended?

(10.) Would you advise the multiplying of boutiques or bazaars—until each two or three estates have their own—in order to prevent coolies wandering a distance and being tempted?

(11.) Are you troubled with a liqourshop in your neighbourhood, and do you think labour would be saved if liquorshops were abolished, or reduced in number, in the purely planting districts?

ANSWERS:—No. I.

Dikoya.

(1.) I have worked wire shoots for many years, and find them of the greatest use, and most economical in transport of leaf and firewood, and consider they should be used on all steep estates. I don't think they do much harm to leaf if care is taken to have a good buffer at end of shoot, and the leaf taken out of sack as soon as it arrives at lower end.

(2.) I use single bullock carts for transport of bulky manures; they can go on a 5 to 6 ft. road, and amply replay cost of road construction, in yearly saving on application of bulky manures. When applying bulky manures, the carriage from the road to the different parts of the field, should be done by *men* in sacks; this cheapens application, as they carry more in sacks.

(3.) I have no experience of Tramways.

(4, 5.) I don't think any harm is done by hand weeding, though much damage is done when scrapers are allowed. Nowadays with scarcity of labour it is more than ever important to keep estates free from weeds, as an additional inducement to kanganies and coolies, who make money out of their contracts, and it keeps them contented. A weedy estate is harder to provide with labour, unless they have some other compensating advantages.

(6.) I have never tried any experiment of growing clovers, to be dug into the soil, although I think they would probably do good; but for the reasons stated above, relative to labour—I would not go in for it.

(7.) Tea responds well to close draining, and requires closer drainage than coffee used to; if this is well done, I think the loss of soil would not be great. I have never tried planting rows of cuscus grass above the drains, if it could be kept under control, I think it would be advantageous.

(8.) If care is taken beforehand, a great deal of transport can be saved by coolies carrying to and from work, timber, &c., stones for Factory, if building is going on, if it is so arranged that it is ready for the coolies near where they leave off work; firewood too, can be carried this way, and artificial manure can be carried in light loads by the pluckers from factory to fields nearer to point of application. All this if arranged beforehand, saves putting on special transport coolies, and is no great delay or trouble to the pluckers or pruners going in that direction.

(9.) Coolies like gardens round their lines, but I think it is only the few who take trouble to crop them. Allowing coolies to keep cattle is a great inducement, and it pays to give up some grass ravines for their use, and after building small sheds for their cattle, they are less likely to wish to move.

(10.) No. I don't advise increasing bazaars, the coolies would only increase their debts; but I think it pays to get rice carted each Sunday to the nearest point to the estate, so as to avoid the absolute necessity of all the coolies going to the big bazaars of the district, as there is no doubt, they are often crimped.

(11) I have not suffered any inconvenience from liquor shops, and do not think their *total* abolition necessary, though I should not like to see their numbers increased. DIKOYA.

No. II.

(1.) I have worked a wire shoot for some years, but only used it for firewood, and on the majority of estates, do not think much labour could be saved if used to convey leaf to the Factory.

(4.) I believe strongly in clean weeding and with reference to questions 4, 5, 6 and 7 think that to a great extent, the planting of Grevilleas regularly through the tea meets the difficulty. Planted closely to start with, and thinned out as they increase in size they not only supply a certain amount of firewood, but do good to the tea. They manure the land with the quantity of leaf that falls, reduce the number of coolies required for weeding and prevent waste.

(9.) I believe in giving ground for gardens to the coolies and think it helps to make them contented and to stop on the estate.

(11.) The fewer the liquorshops the better. I find coolies who never drank arrack except at their annual festivals now drink it daily, owing to the proximity of an arrack tavern which benefits the proprietors of the tavern *only*. BOGAWANTALAWA.

No. III.—Alagala.

(1.) I have had no experience in working a wire shoot, but I have often seen one at work. It might be more largely employed in saving the labour of conveying the morning's delivery of tea to the Factory. I have not observed leaf damaged by the transit. The wire is useful in carrying fuel.

(2,) I have not observed any other appliances worked to save labour. Managers are keen to adopt any such that might arise.

(3.) Small tramways could be profitably employed on Estates of over 500 acres in extent, when the wire could not be used, and when land upon which to lay the tram is free, but upon small estates the expenditure would be prohibitory. Indeed I believe a narrow road for conveying leaf by carts where a wire could not be used would be cheaper.

(4.) Hand weeding it without the use of anything but a small piece of wood would loosen only a trifling

amount of soil; using mamoties and weeding once in 3 or 4 months as in the days of coffee, loosens much soil which is carried away to the paddy-fields as in this district, benefiting the paddy growers, and elsewhere into the sea. I do not believe in the retention of weeds, even small ones, for the formation of humus. In weeding by hand, I would only leave moss.

(5) Monthly weeding by hand—there can be no saving of labour upon this; it is most effectual and cheap.

(6) I do not believe in growing anything in proximity to the tea bushes to be dug into the soil—manure is the only thing I should dig in.

(7) I cannot suggest anything in the way of improving the drainage. I have seen cuscus grass planted on roads, but the roots I have found weakening the trees alongside.

(9) Giving coolies garden lots would entail much annoyance to the Superintendent as frequent robberies among the garden holders will arise and on each such occasion the Superintendent would be expected to give redress. By the sale of the produce of the garden coolies will secure money and we know the richer they become the less work will they do.

(10.) Certainly thero should be no addition to Bazaars—each addition would mean another source of borrowing by the coolies, the new bazaar would offer greater indemnity than the old one to do so.

(11) Being surrounded by villages where the kitool flourishes, coolies in this district drink the toddy of this tree in preference to arrack—the drink being adulterated with bad tobacco and chunam-lime, it quickly effects the brain. I do not see how the sale of this toddy can be checked.

OLD PROPRIETOR AND PLANTER,

No. IV. Central Province.

(1) We have seven wire shoots working here very satisfactorily. Where the land is steep they are invaluable as labour-saving appliances. They might be much more largely utilised than they are. I have observed little or no damage to leaf where due care is taken. Minor cart roads to end of shoots might be more availed of.

(2) Well-equipped factories are practically complete so far as labour-saving appliances go, but for transport of chests and fuel, where factories are not favourably situated, aërial tramways might be much more largely used.

(3) Tramways as suggested are not suitable on average estates.

(4) & (5) No, distinctly not; clean weeding is absolutely indispensable on all Ceylon estates.

(6) I am starting an experiment with Scradella grown apart from tea. Is the Oxalis referred to the obnoxious weed defined by Mr. Nock as *Oscalis violacea* belonging to the Geranium family?

(7) As satisfactory as the conditions admit of. I do not know of any practical means of preventing loss of surface soil during heavy thunderstorms. I would fear more damage to surrounding tea than benefit from retention of soil by growth of cuscus unless under exceptional circumstances.

(8) Beyond aërial tramways, wire shoots and minor connecting cart roads, I can think of no means whereby labour might be saved.

(9) Ground for gardens for the married and settled old coolies is certainly appreciated, and adds to their contentment. A boutique on the estate under estate control is a decided advantage where the estate is situated far from the market.

(10) As perquisites, weeding contracts at R1 per acre kept thoroughly clean, leaving a good margin of profit to kanganies, and to the coolies payment by results for plucking, that is a rate per lb. or a day's name for a fixed quantity and from 1 to 2 cents per lb. for every additional lb. plucked.

(11) Not troubled with a liquor shop in this neighbourhood, but the illicit sale of arrack and toddy, in the villages some little way off, are certainly harmful and demoralizing.

D.

No. V.—Lowcountry Estates.

(1) Wire shoots are not numerous in the lowcountry as the lay of the land is unfavourable. Shoots save labor only on long lines and if carefully placed do no injury to tea leaf.

(2) The actual saving of cost of labor is not so much in the want of appliances but in the getting the day's work done, and the competition is so keen that planters overlook short work in fear lest pressure would induce his men to give notice to quit, hence heavy cost.

(3) Tramways—primary cost and upkeep together with interest on outlay would—only answer on large properties with central factory.

(4) Tea during the dry weather does not appear to suffer from low-growing weeds, but if not cleared and cleaned after the third month, turns yellow and does suffer. This I attribute to surface moisture in undue quantity.

(5) Tea, generally in Ceylon, will not bear the growth of weeds for any lengthy period. The chief feeders are all surface and any surface feeder starves the rootlets.

(6) No, I tried Sea Island cottou around germinated seed and satisfactorily for six months, but had to eradicate it after that.

(7) Drains cut at gradient one in thirty will carry off water and wash is only very heavy rain, but require constant removing of silt which is saved, but the best ingredients of the soil are wanting.

(8) A cooly can only do a certain quantum of work for the day's pay and if this be systematically agreed to, the cost of production will not be excessive. If planters pay different rates of pay and pamper their coolies so that they will not want to quit service, cost of labor must rise.

(9) Coolies who know masters in touch with their men rarely want to quit and contented coolies always ask for plots of ground to grow their vegetables, &c. When this is so, coolies generally live contentedly.

(10) I have tried this and the Tamil cannot compete with the Moormen or Sinhalese boutique-keeper. Wherever estates spring up there the boutique springs up.

(11) Not troubled. A liquor shop is necessary in the district and one legally established is under control. The Tamil will have his liquor occasionally and why not? The Superintendent should have it in his power to supress excessive drinking.

I have never lost my cooly connection since 1857 and have yet one alive of the original kanganies, whose relatives and descendants number 76 here and their pay is today what it was in 1857.

B.

No. VI.—Uva.

(1) I have not had much experience in the working of shoots and have seen a good many working and am firmly convinced that where practicable they should be erected. If not kept too tight and bags are allowed to come in slowly at end, no harm is, I think, done to leaf, but if kept too tight (the rope) leaf is considerably broken by sharp collision at terminus.

(2) Small tramways would, I consider, pay on large estates where manuring is done extensively aud where land is of a steep nature.

(3) Yes.

(4) I have always been of the opinion that weeding has been overdone. It is, of course, essential that some weeding should be done and all seeding weeds removed, but all mosses and weeds that do not climb but cling and cover ground should, I think, be left.

(5) Yes.

(6) No, an experiment on a small field of tea would be an excellent idea.

(7) The present system of drainage appears to work satisfactorily in taking the water from the ground; but the amount of soil taken with it is tremendous. The allowing of the selected weeding would do a large extent, I think, to rectify it. If the

cuscus grass were put above drains on steep land where wash is great, it would do good; but on land of the easier lay nothing is required.

(8) ———

(9) Every estate should set aside a small acreage round lines for the coolies to have small gardens to grow cabbages and the such like.

(10) Distinctly no. The present labour troubles have, I consider, largely to be attributed to the debts run up in the boutiques and the unmerciful prices charged by the botique-keepers and interest charged on loans made by them to coolies and kanganies on surrounding estates. The farther the botiques are away from the estate the better. Coolies then only go less often, and though perhaps the estate loses a day by their having to go a distance, it is best in the end.

(11) There are several liquor shops not far distant from here; but other than that coolies have a good deal of secret selling amongst themselves. They do not give much trouble. If the regulation were made in all liquor shops in the planting districts that all liquor were to be drunk on the premises, and the shopkeepers only allowed a license to that effect, it would do considerable good. C.

No. VII.—High District.

(1) Wire shoots are very advantageous for large estates or groups of estates where the lay of land is suitable. If properly fixed up, damage to leaf should not occur.

(2) Nil.

(3) Certainly not. Initial cost prohibitory.

(4) *Weeding*.—Poor coffee was not given a fair chance in many cases, but to give clean weeding credit for killing it is really too outrageous.

On steep land drains were usually conspicuous by their absence and as on many estates weeding had to be discontinued during crop time, through insufficiency of labour (no new song this you see) and of course weeds grew apace and doubtless for months they helped to prevent wash; but, as they had to be ultimately exterminated by that useful implement yclept a mamotie, during the dry weather tons of soil trickled down the hillsides of its own accord or aided by the gentle influence of a North-East gale and when the rains descended and the floods came, poor old coffee, as well as its planters, felt sick indeed.

Rocky ground has naturally unusually rich soil and rocks tend to lessen wash: so it is not surprising that coffee under such favourable circumstances should struggle through, and I therefore decidedly repeat certainly not, in reply to No. 4.

(5) Certainly not, once more; and as for leaving mosses, selaginellas and ferns which so readily attach themselves to the stems and branches of tea, I would as soon think of advising a fellow to discontinue bathing for his own health's sake and the general pleasure it would provide for his friends and neighbours, as encourage this.

(6) With over-production continually staring us in the face, why try to go one better seeing present results are sufficiently satisfactory for most, if not all, of us.

In any case, I would not advise experiments with lupines or anything else of that sort except on the easiest lay of land.

(7) Where drains have been cut at an easy gradient and are periodically attended to, there is practically no loss of soil. In steep graded drains silt pits would prevent loss.

Guinea-grass was planted in the coffee days to prevent wash and it did so to some extent; but it killed the coffee near it and your cuscus will probably have the same effect on tea or at all events render it unproductive in its immediate neighbourhood.

(8) Nothing to suggest.

(9) Coolies are invariably allowed garden ground and in many instances are permitted to keep goats or even cattle where grass is plentiful or grazing lands are on or adjacent to the estates: so what more they can want to make themselves comfortable I fail to see.

(10) A multiplication of bazaars would do no harm, more especially if run on co-operative principles but what is to prevent the tempters from frequenting these and moreover Ramasamy, like a sensible man, wouldn't trust his own mother further than he could see her—so I fear the co-operative idea is impracticable.

(11) Liquor shops are an abomination and lead to breaches of the peace and such like and should therefore be discouraged; but there is no means of preventing the illicit sale of liquor in the lines, in a quiet sort of way, as the low-caste cooly nowadays insists on having his stimulants.

On the whole I think your queries might be answered thus:—What is, is best. "Farmer"

No. VIII.—Low Country.

(1) I have had no experience of wire shoots; and my observation of them has been very occasional and superficial, as I am seldom in the hill country.

(2) None.

(3) Small Tramways, I should think, could be profitably used only on Estates of considerable extent where labour is scarce. Original cost is the stumbling block.

(4) It always struck me that weeding was overdone on steep coffee lands, as on Tea. The few weeds industriously scraped off could do less harm in exhausting the soil, than the scraping in helping it to be washed off. The pulling out of strong weeds should generally do.

(5) Yes; less frequent weeding of the surface weeds, involving selected weeding. That is, the deep strong weeds would be taken off regularly, and the others at less frequent intervals than now. Their retention always, especially in damp and shady fields, would sour the soil.

(6) No experience; but would not the success of cotton (some years ago) with Tea on some estates, justify experiments?

(7) In the absence of experience in the hill country, I hesitate to offer an opinion; but it has often suggested itself to me that traps should prevent the carrying away of much valuable soil. Though the wash is less in the lowcountry, I have silt traps, and have also found cuscus useful in rugged patches and on broken ground.

(8) No suggestion to offer.

(9) Certainly, a patch of garden to each set of line would be an advantage; and I always regard the beginning of horticultural operations with pleasure, as suggesting a comparatively permanent settlement. Gifts of cloth or cash to the best workers on the estate, on *peranals*, are highly appreciated. R1·50 to a Sinhalese for his poll-tax was welcomed as a royal gift.

(10) The less boutiques the better, unless the keeper is a good man, or can be bound down as your tenant to give no credit. Indebtedness is the cause of much unrest, and perhaps bolting.

(11) I am not troubled with liquor shops; but the illicit sale of toddy and arrack is a nuisance. Taverns at regular intervals are a necessity. The cooly likes an occasional drink; and if he cannot get it fairly, as master does, why?—he must encourage the illicit uncontrolled seller.

F.B.

Siyane Korale, Aug. 10.

No. IX.—Southern District.

(1) It has long been recognized by planters that wire shoots are most helpful in the working of an estate, and that in the long run they greatly reduce the cost of expenditure in the transport of leaf, firewood, manure, &c., and on estates where the lay of the land is suitable, feeders to a main line of wire are easily adjustable; and the more this principle is adopted the greater will be the saving in labor. As regards damage to leaf, this could be avoided, if the gradient at the terminus be so arranged as to diminish the fall, and prevent the loads coming down with too great a shock.

(2) While wire shoots can be only used with advantage on comparatively steep land; on those estates where the lay of the land is fairly level or gently undulating, wheeled traffic, in the shape of light carts, made suitable for round roads, and drawn by ordinary native cattle, could be used with the greatest advantage.

(3) Tramways could not be used on the average number of estates, which are mostly steep; but on a percentage of them, where the lay of the land is suitable, *i.e.*, practically flat, 12″ or 18″ gauge tramway might be laid down, proving very beneficial and a great saving of labour. It must, however, be understood that individual capitalists could hardly be expected to gain from such an undertaking, as the initial cost would be prohibitive; but to a Company, with capital at their back, such a scheme would undoubtedly commend itself, and be found workable.

(4) The system of weeding adopted and carried out in Ceylon for so many years with success has proved itself to be the right one, and to change it now would, in our opinion, be unadvisable.

(5) Mosses and ferns might be left unweeded to a certain extent, but care should be taken to prevent them from spreading too thickly over the ground, as moss, especially, has a tendency to not confining itself to the ground alone, but of encroaching upon products in its immediate vicinity.

(6) We have never tried the experiment of cultivating any crop of lupines, &c., between the tea, so as to prevent wash, and hardly think it would be likely to succeed.

(7) We are of opinion that it would be unadvisable to effect a diminution in the system of drainage of estates as at present carried out. In preference to cuscus grass, a close hedgerow of tea, planted immediately above each drain, would be found serviceable as well as remunerative.

(8) The only other way we can conceive for reducing manual labour, is the introducing into factories of the latest approved machinery; and if some ingenious person—yet to be born perhaps!—would invent an effective Plucking Machine, it would reduce the labour requirements of estates by at least one-half, to say nothing of the vast reduction in cost of production which would ensue, which, at present prices, is principally what we have to strive for.

(9) Coolies are as well off as they possibly can be in this respect, and we consider that the granting of any further perquisites or indulgences would not make them any more contented but rather the reverse. Volumes could be written on this subject were time and space not limited.

(10) We believe in groups of estates having their properly established rice stores and boutiques immediately under the supervision of the Superintendent. The ordinary boutique-keeper, who swindles the cooly out of his hard-earned wages, and encourages him to indulge in extravagance, is the man who is lining his pockets at the expense of the country and is without doubt the curse of the planting industry of Ceylon.

(11) Indiscriminate licensing of taverns and liquor shops in planting districts is another fruitful source of injuring our labour supply, and Government have a deal to answer for in this respect. Illicit drawing and sale of toddy and arrack is another crying evil, which should be put down with a high hand by the Powers-that-be.

TWO OF THEM.

REVIEW OF LETTERS NOS. I. TO IX.

The questions which we have propounded by circular to planters and others on the above subject, are not only supplementary to those which have been most useful in eliciting information on the cultivation and manufacture of tea in all their branches, and on the conditions which have affected the price of tea in the markets of the world, but they may also be regarded as naturally flowing from the answers which have been published in response to our first circular. It may be remembered that, in those letters, the cry from district after district was, that labour was scarce; that the scarcity rendered the application of manures difficult, if not impossible; that even where there was sufficient labour, it deterred many from applying manures because of the probability that the labour would not suffice for the heavier crops which would follow manuring; and, perhaps most important of all, that it led to plucking at longer intervals, thus rendering coarser plucking, rasping liquor, and the preponderance of lower grades inevitable. In these circumstances, and with so serious a weight of testimoney on the direct and indirect drawbacks of an insufficient labour supply, it became necessary at once to inquire, how can we increase our labour supply? Or, how can we utilize to the best advantage that which we have? The difficulties which beset recruiting have been well-known and appreciated by the planters and the Government for many years past; and in recent times they have been the subject of anxious inquiry, without in any way improving the outlook. That, however, is not of direct concern in the present investigation; but even if it were possible to draw on the labour reserves of India according to our needs, the duty of economizing what we have would yet remain. And especially necessary is it that we should make the present supply of labour suffice, in view of the shrinkage of profits caused by low prices, the upward tendency of exchange, the dearness of rice, and the growth of so-called coast advances, much of which, we fear, are all absolutely irrecoverable, and to which much more will have to be added if our labour force is to be permanently increased. It is these and such like considerations which weighed with us in framing the questions to which we have already received a very encouraging volume of answers.

We purpose drawing attention now to the first nine letters which we give above. The testimony in favour of wire shoots, as a labour-saving appliance, comes from all who have tried them—Dikoya, Bogawantalawa, "C" from Uva, "Farmer" from High District and "Two of them" from a Southern District, certifying from experience to their economy in the transport of manures, firewood and tea-leaf; while others who have no personal knowledge of "shoots" have observed their satisfactory working; and all seem agreed that their use might be greatly extended, especially on steep estates. Now hhre is a most important means of economi ng labour, which has long passed the experimental stage—it was in use in the palmy days of coffee quite a generation since—and which comes to us with the highest credentials. Why is it not more largely in use? For, as "B from Lowcountry Estates" shrewdly points out, it is not only the direct saving in the cost of transport which has to be considered, but the setting free of labour for other urgent work which must be done, and the ability to exact a fair day's work for fair wage where it is not necessary to humour coolies for work which is distasteful to them, and of such work, carrying loads unquestionably is one form. The only doubt that is felt about wire shoots is connected with damage to leaf; but all our correspondents are agreed that there need be no damage, if the wire is not stretched too

tight, if there is a good buffer at the end of the shoot or the gradient is not too sharp, and if the sacks are emptied promptly as they arrive. Where necessary, single bullock carts have been found most useful in the transport of bulky manures to the fields to which they have to be applied, into which such can again be carried in sacks if *men* are employed, as baskets hold less. Tramways do not appear to find favour on account of their heavy initial cost; but on large estates of 500 acres or more it is admitted, they would be found useful and would probably pay for their cost. On small estates, a road and single carts will be found more economical in the opinion of "Old Proprietor and Planter."

On the question of "Weeding," there seems to be a considerable difference of opinion; for though clean weeding commends itself to a majority, as justified by experience, one admits that damage is done when scrapers are allowed. Some insist on hand-weeding alone, some would allow mosses and ferns to remain; some regard these as dangerous; while only two "C" from Uva and "F. B." from Siyane Korale declare that weeding has been overdone. The weight of opinion, so far, is therefore decidedly against any interference with the hoary system, which is further commended as helping to humour kanganies who make money out of weeding contracts, and the evils of which may be guarded against by careful drainage. But "Bogawantalawa"'s suggestion has the merit of serving many purposes, and of apparently covering five out of our eleven questions—that grevilleas should be more extensively planted than now, and be gradually thinned out as they overshade the tea. The advantages are that the shade will reduce the weeds, the litter of leaves will serve as manure and prevent wash, while the thinned out trees and the prunings should supply firewood. Subsidiary crops, whether for profit or to be dug in as manure, do not find favour with our first batch friends. Lack of labour and the fear of wash are the chief considerations urged against any turning up of the soil; while "Farmer" preaches contentment with results which are "sufficiently satisfactory" without any adjuncts to tea. That is just begging the question; for if all are as prosperous and happy as our friend seems to be, inquiries like those we have initiated would be wholly unnecessary.

All our correspondents are practically agreed on the advantage of allowing coolies garden plots for vegetables, &c. Not only is a garden a source of profit and of health to coolies—vegetables in too great abundance cannot be consumed by those into whose diet dried and salted fish enters largely—but it keeps them from mischief when "absent," and binds them in a very desirable way to the "tottum" or "wattie." It is particularly satisfactory to find so great agreement among planters as to the necessity of being in touch with their coolies—a point not sufficiently appreciated, we fear, by many of the new generation. A kind or jocular word, patient attention to some trivial complaint, sympathetic notice of a minor ailment:—all these go a great way to cheer the Tamil immigrant labourer and make him content with his lot, and even to prevent quarrels and misunderstandings in the lines. "B" says that he has never lost his cooly connection since 1857; and he yet numbers among his kanganies one of the original lot, whose relatives and descendants on the estate number 76 and are satisfied with the rate of wages they got 40 years ago. Surely that is remarkable testimony to the importance of good relations, and "B," like most of the others, does not believe in enforcing abstention from arrack. A licensed tavern can be controlled; its abolition would be almost certain to lead to unchecked illicit sales.

(Letters Continued.)

No. X.—Northern District.

Wire Shoots.—I have worked these for many years and use them for all purposes, viz. (1) sending down firewood, (2) tea leaf in coir bags, (3) jungle soil for manure in gunnies, etc., etc. If lots of packing are placed against the delivery end, the leaf will not be much damaged, but if left to strike the tree or rock to which the shoot is attached the leaf will to a certainty be very much bruised.

Other Labour Saving Appliances.—Aërial tramways are undoubtedly foremost in this respect, and another few years will, I am sure, see many more erected in the tea districts. Terrestrial Tramways are out of the way, except on places like Mariawatte, and there Appuhamy and his bullock cart would be as efficient and much more cheap.

Weeding.—Surely this question has been threshed out long ago. A clean estate or none at all. There is no doubt "humus" is what our poor clayey Ceylon soils want, and no better way to obtain a supply is to grow a thick crop of some nitrogenous weed, the same to be cut down and forked into the soil before it seeded. But look at the labour it would require, let alone the thousands of obnoxious weeds that would grow and seed unseen among the sort you were raising! Who is there bold enough to try? Such a beneficial green manuring would work wonders and make our soil last for years to come. An American plant called the Californian Cow Pea is what should be used for this green manuring. See back numbers of the *Tropical Agriculturist.*

Drains.—If the cross and centre drains now in use all over the tea districts are properly attended to, no better plan for the money we can afford to spend on this head can be employed. I know of estates where every coffee tree was terraced, and every roadside built up with hammer-dressed stone over hundreds of acres, until the land looked like the ramparts of Malta. This work was done splendidly many years ago, and it would be very interesting to know if the tea now growing on this land is better than what is growing on other and unterraced fields on the same estate. The capable Superintendent of Spring Valley Estate, Badulla, could say so if he liked.

Coolies.—The possession of small gardens round the lines undoubtedly serves to make the cooly contended; but it won't deter him from leaving the estate if his kangani orders him, or if he wants to go himself. It certainly adds to his health.

Bazaars.—Each estate should have its own bazaar if possible, under the fatherly supervision of the Superintendent, and owned by the head-kangani. The evil results arising from coolies going long distances to bazaars for their curry-stuffs, etc., are incalculable. They come across crimps and pimps, and bullies of every sort, get into gambling hells, and get drunk and are most likely robbed and beaten. I am now building a big kaddy on this estate which I hope to get my coolies to come to in future instead of going weekly to that den of iniquity, Huluganga.

Liquor Shops.—The arrack tavern is an evil we must all put up with, but liqour shops are the very mischief. In these shops the better class of cooly, the conductor and tea-maker go and booze and get corrupted. Otherwise they would not drink as they are ashamed to stand and drink at the arrack tavern with the common herd. L.

No. XI.—Uva.

In replying to your questions I must premise that for all practical purposes we have plenty of labour

in these parts. Occasionally, of course, we are a little rusted, but speaking generally we have a sufficient labour force and advances are small on the estates. I manage about R2 per head.

If it is asked how it is this state of Arcadian simplicity exist I would say it is due to several causes.

For one thing most of the Managers have been on their estates for a long period, from 5 to 15 years, and are well-known to the coolies. For another, (but let no whisper of this be heard beyond the editorial sanctum,) there is still coffee on our estates and Ramasamy dearly loves a fragrant cup in the morning and I fancy generally gets it!

Then most of our places being still in the transition state from coffee to tea, it is not yet altogether a matter of producing so many pounds of tea at so much a pound; we have our coffee to prune, our cinchona to cut out and our clearings to open and the cooly has more variety in his work.

Having said this I will only reply to a few of your questions:—

(1.) Have no experience. As regards their damaging leaf I fancy they do, but the test is what prices do those obtain who use them?

(4.) In theory, Yes. In practice, No.

(5.) I have known less frequent weeding tried on several estates and it has always ended in the place having to be cleared up with mamoties to the permanent damage of the property.

Leaving mosses and ferns was tried on a well-known estate in Dimbula and the coffee went back rapidly much more so than on the clean weeded portions of the estate. I have not seen it tried with tea.

(7.) Not at all satisfactory. The planting of cuscus grass sounds worth trying.

(9.) *Certainly* all coolies should have gardens if they want them.

(10.) At first sight this would seem a move in the right direction, but care would have to be taken as to who held the strings in the estate boutique, or the last state might be worse than the first.

(11.) Liquor and liquorshops are an unmitigated curse to our labour force; but under the present system all that can be done is to try and get a shop closed here and there. A benevolent Government having carefully fostered a taste for liquor for generations now says to us:—"There is no use in curtailing facilities for obtaining drink, for if we close our licensed shops there will be illicit sale." And so it is, but whose fault is it?

No. XII.—Medium District.

(1). I have seen wire shoots used with great saving of labour on large *steep* estates: in one case a transport of 5 miles is saved by means of 3 shoots which take the leaf to the store in twenty minutes. Leaf is not damaged provided it does not arrive at the bottom of the shoot with too great a speed, which can be checked in the case of steep shoots by means of a siding or "shunt'' when the leaf is caught.

(2). Hill tramways where spare power is available are useful for transport of chests, etc., from factory to road, if the former is not on cart road, and is yet within a reasonable distance of it.

(3). I do not think small tramways would pay on average estates.

(4). I do not think weeding is overdone on *properly drained* estates.

(5). I certainly would not advise less frequent weeding or "selected" weeding; the latter would be much more expensive and require very careful supervision to see that only the proper weeds were left: less frequent weeding would mean less profit to the contractors, and kanganies will not stay on an estate where they make no profit on contracts.

(6). I have not tried the experiment.

(7). The present system of *close* and rather *gentle* gradient drains is a great improvement on the old system of steep and rather far apart drains. I find drains with a gradient of 1 in 34 or even 1 in 30 about 26 to 30 feet apart on steep land save the surface soil excellently. I have not tried cuscus grass in the way suggested.

(9). I strongly recommend a small portion of ground for gardens being given to coolies round every set of lines, I find it makes them much more contented.

(11). The number of liquor shops in this neighbourhood is far too great; undoutedly labour would be saved if they were abolished or even reduced in number. Drinking is increasing very much among the coolies; after every pay day fully twenty-five per cent of the men don't come out to work until they have drunk all their pay. A.

No. XIII.—Matale North.

(1) I should say Wire Shoots would not be suitable for conveyance of produce.

(2) A hill tramway might save time and labour on a large estate, and be economical when there was good water power.

(3) I think ordinary tramways too expensive for Estate use.

(4) I think the present system of clean weeding is the best and most economical.

(5) The more general growing of shade would certainly render the working of an estate much cheaper, and therefore reduce the necessity for labour considerably. Weeding can be thus reduced by 30 per cent; when trees are selected from which there is a heavy fall of leaf, wash is almost done away with, and drains require little attention. The constant fall of leaf also is undoubtedly good for the soil and in time renders old worn-out soils fertile.

(6) I think good comfortable lines and plenty of them have a good deal to do with making an estate popular and certainly improve the general health of an estate. An estate caddy is an advantage; but the keeper of it must be closely watched and there is a good deal of trouble attendant on one. A liquor shop is probably an evil that must be tolerated, but if the duty was raised on arrack very considerably it would check drunkenness to a great extent. My opinion however is that no great change for the better will take place in the labour supply until the pay of the *cooly*, not the Kangani, is raised all round. We have now heavy competitors for labour which we had not before, and yet we are actually paying the individual cooly less than we did 20 years ago. The pay of a good cooly in the coffee days was generally 37½ cents; of a good woman 27 to 29—against 33 and 25 at present; the coolies then, in crop time earned large amounts for extra and cash pickings, at least as large as are earned for extra plucking now—and living was cheaper.

(7) The present rate of pay is adhered to, because tea has to be put into the market at so many cents per lb.

(8) The Superintendent therefore has to make it up in advances which become so large that they in many instances can never be recovered, and the cooly gets to think far more of his advances than his wages. Such a system is rotten and cannot last. M.

No. XIV.—Uva.

(1) Wherever the gradient would allow wire-shoots are most valuable money savers; don't damage tea if sent in coir bags and packed loose.

(2) —(Nothing; on other appliances.)

3 If cost is not too heavy. In Ceylon we must have practically *no* weeds or quantities, but tea is partially a weed killer; care should be taken to prevent surface being scraped.

(4) Yes: (weeding overdone).

(5) Our present system is good enough if scraping is fought against.

(6) No (Experiment tried to cultivate lupines, etc. so as to dig in.)

(7) Can't say. (Drainage).

(9) Coolies now go to the highest bidder at the command of the Chetty. He was a free agent; but is now a slave to the Chetty and however much he loves his

bome they force him to move on to another if his master will not yield to extortion.

(11) Arrack taverns are a curse to the estate labourers and the Arrack renters seem to encourage illicit-sales and Headmen don't try to stop it. R.

No. XV.—Medium District.

(1) We have a large number of wire shoots and find them labor-saving and economical. The leaf is injured to some extent in them.

(2) Wire overhead tramways in the absence of cart roads meet all requirements of transport to or from the estate and it is surprising that they are not more generally used.

(3) The expenses of rail tramways would be prohibitory, on most estates.

(4) We believe in keeping the estate thoroughly clean,

(5) The mosses do not seem injurious to tea on well-drained land.

(6) No. (See above).

(7) Where the lay of the land permits, drains cut at a low gradient—say one in twenty to one in twenty-five, so as to permit the water to drain off slowly,—seem preferable to a steeper gradient which scours and carries off the loose soil with it. This does not apply to steep land and the drains must be deep.

(8) For transport of fuel and leaf, wire shoots on steep land and traced roads over which light carts can be taken on flatter land, are all that occur to us as applying at all generally.

(9) On estates not at a high elevation the more open the surroundings of the lines the better on sanitary grounds. Space for gardens is generally left; but is more often than otherwise neglected by the coolies; plantains and perhaps a few brinjals flourishing in the accumulated filth. Lines should be built wherever practicable near a good supply of water and where there is a slope in all directions from them. Where practicable the keeping of stock should be encouraged.

(10) Boutiques in close proximity to the Factory leads to pilfering; on the other hand coolies should not have far to go for their curry stuffs.

(11) We have no liquor shops near the estates; but illicit arrack selling goes on everywhere. T.

No. XVI.—Northern District.

(1) About ¾ of my leaf is brought in by means of Wire Shoots. I think they are very generally used. I do not see how any injury to leaf can occur with ordinary care.

(2) Wire tramways are being used on several Estates to bring tea to cart roads. Few Estates in Ceylon are large enough or flat enough to make a 12″ or 18″ tramway of service. But it would be an advantage on some in the low country.

(4) The cheapest Weeding and therefore that which occupies the least number of coolies, is undoubtedly the monthly contract system, which if properly carried out can be done for R12 per annum per acre or even less. Viewed as saving expense not a fern or a moss should be spared, as they would soon form seed beds for other weeds. In damp climates, moss would, if left, soon choke up the trees and spaces under them and make the bark of trees unhealthy. The cleaner the Estate, the less the soil is disturbed and the less "wash."

(5) No—not because I think that less frequent weeding would do harm to the tea, but because it would be more expensive. Even if dug in (where the nature of soil admitted) twice a year, it would be expensive and require more labourers.

(6) Quite, when thoroughly done. I would not plant *anything* in good Tea, but in bad, and on exposed ridges, Grevilleas if not too close are undoubtedly beneficial and make weeding cheaper.

(7) I know of none.

(8) They are too well paid already: the facility with which they can get advances is the great evil.

(9) No. A shop in the Lines has worked well in some instances, but it generally falls into the head-kangani's hands.

(10) Yes. Abolishing liquor shops or their reduction would (if it were possible) undoubtedly increase the efficiency of the force we have; nearly all coolies drink; and many a gang is lost from drunken quarrels.

T.

No. XVII.—Mid-District.

Your circular to hand opens up a very wide subject—or rather series of subjects—to which it would be difficult to reply within the limit of the lines allotted to each question.

(1.) I have no personal experience; but believe the use of Wire Shoots to be capable of very great extension and improvement.

(2.) Have no experience of Factory work. Have used "Thompson's Patent Tea Pluckers" on new flush after pruning, with a considerable saving of time and labour; but hand plucking is found to be more satisfactory after the first two months. With an insufficient labour force these clippers should certainly prove of value as a labour-saving appliance.

(3.) I consider that Tramways (on the ground)—even of the smallest gauge—would be impracticable on by far the larger number of Upcountry estates,—chiefly owing to the difficult nature of the land and the costliness of construction. But overhead haulage tramways (with wire shoots) might—and probably will—be more largely employed as labour difficulties increase.

(4, 5.) I am very strongly of opinion that WEEDING has been and is being overdone in Ceylon. I am convinced that vast sums have been thrown away on injudicious weeding; the labour and expense being not merely wasted, but employed to the actual detriment of the property. The result of overweeding is everywhere visible in bare red soil divested of every particle of humus and affording no lodgement for fresh accumulations of leaf-mould. With the surface soil went the coffee. Tea being a deeper feeder is not so absolutely dependent upon surface soil; but how much it is benefitted by the presence of humus is amply evidenced by the more flourishing condition of tea bushes immediately surrounding a well filled weed hole.

On steep land, the Indian method of hoeing in the weeds every two or three months would be quite out of the question. Such a plan would soon transfer the remainder of our soil to the low-country. But a system of water holes between each 4 trees, into which the weeds, at the periodical (bimonthly?) handweeding, would be thrown and allowed to rot, erdtld in my opinion produce good results It must be remembered that weeds returned to the soil in this manner not only give back what they took out of the soil, but actually enrich it with the store of nitrogen that they have extracted from the atmosphere.

At the same time there are certain mosses and other small plants that might be encouraged to assist in the formation and retention of humus,—serving also to minimise wash. There would be no question of the necessity for artificially manuring tea if nature were allowed to play her willing part in helping to renovate the soil. The favoured plants should of course be selected with discretion. Such as have light surface roots and do not form too matted a growth being preferable. I have here a plant admirably suited to the purpose. I have submitted specimens to the Director of the Peradeniya Gardens for identification. The "Liver-worts" (Marchantia), amongst the moss-like plants, are *not* suitable, for the reason that their very close growth would interfere with the proper aeration of the soil. The advice of an economic botanist—to test the plants and inform us which would best enrich the soil—would be valuable. Possibly Mr. Willis may give us the benefit of his scientific knowledge.

(6). I believe that no systematic experiments have yet been made in Ceylon in growing leguminous crops, to be dug into the soil. I fear that this would be open to the same objection that arises in the case of the Indian plan of hoeing in weeds. It might, however, be tried in connection with the system of water-holes suggested above. In districts

where gram is cultivated manurial experiments might be made in the use of the stalks and leaves after the removal of the grain. I believe very good results were obtained in India some years ago, by the use of the leaves of *Acacia decurrens and dealbata* as green manure. The trees were grown in waste places and cropped periodically, the leaves being placed in open holes in the tea and allowed to partially rot before being covered up. I know from experience that the fallen foliage of these trees forms good leaf-mould more rapidly almost than any other kinds. Grevilleas shed an enormous amount of leaf; but it takes a very long time to decay and form soil. I do not think that we make sufficient use of material existing close at hand—in the form of coarse weeds and small scrub growing in ravines and wate land. Ail such green stuff thrown into the open holes and allowed to rot would form valuable accumulations of leaf-mould. It would be advisable to let the stuff rot in open holes until the sour stage of fermentation is over. If it is thought necessary to cover the holes at once, a little lime might be included to neutralize the acidity.

One argument that I have heard propounded against a reduction of weeding is:—"How could we satisfy our labour force, if we reduced or took away their weeding contracts?" But while greatly minimising the cost to the estate, a reduced sytem of weeding could be made to leave as large or even a larger margin of profit to the weeding contractor. To give an example:—Say that under the present system of monthly hand weedings a contractor has to weed a 30 acre field for R45, employing 6 coolies in the work. These coolies cost him—at an average of say 30 cts.—R1.80 per day, or for the 20 days on which they would probably be weeding, a total of R36 leaving a profit of R9 per month. With a bimonthly selective weeding the same contract could be rated at R30 per month, and 3 coolies would cover the same ground in the time, at a cost to the contractor of R18, leaving the large balance of R12 for his profit.

Of course under any such system we must resign ourselves to a less trim appearance of our estates. These weedless expanses, that have been considered the acmè of good cultivation for so long and have cost such endless trouble and expense, would please our eyes no more. But surely, if it can be conclusively proved that a reduced expenditure in this particular is accompanied by an increased efficiency, no one would be willing to pay so largely for mere appearances.

(7.) I have long thought that our elaborate system of DRAINAGE—as at present carried out—is merely an ingenious plan for enriching our native neighbours' paddy fields at the expense of our own property. The amount of soil carried off by every shower can be partially gauged by examination of a drain that has been temporarily blocked by some fallen stone or accumulation of tea prunings. What is wanted is some arrangement for checking the flow of surface water to allow of the deposition of the soil in suspension. I have tried the plan of growing cuscus grass above the drains. It answers most admirably from a mechanical point of view; but there is the objection that it is itself feeding upon the soil that it has saved. This grass is certainly a greedy feeder. Some part of the loss might be returned to the soil by repeatedly cutting the grass (a process advisable also to prevent interference with the tea bushes) and using it as a surface mulching. This plan has certainly one strong point in its favour. It affords a great saving in labour and expense in keeping the drains clean. Since the planting of this grass some four years ago—these particular drains have not once had to be cleared out. Not a stick or stone can pass the barrier, and the soil above the grass has gradually accumulated to a depth of at least 18 inches. I have also tried rows of cuscus grass *instead* of drains, with similar results as to trapping the soil; but here the volume of water increases as it gets to the bottom of the slope and is apt to score up the ground too heavily. An ideal system would be one in which the barrier is formed of non growing material, but sufficiently permanent to last without need of repair for at least eighteen months. Could we not utilize our tea-prunings for the purpose? At present they cumber the ground and add to our difficulties by blocking up the drains. Bundles of the green prunings might be fastened by stout pegs in lines following the course of, but about two feet above each drain. Or the prunings from each bush might be similarly pegged crossways below each plant, forming a series of small breakwaters which would catch and retain any drifting soil.

Your remaining questions I will leave to others who have studied those subjects. I have already occupied too much space over the earlier items of your circular, which are those in which I have more particularly interested myself. G.

P.S.—With reference to my above remarks on "Weeding," I am now able to give the name of the small plant which I there considered to be "admirably suited to the purpose." Mr. Willis informs me that it is an "*Elatostemma*." Mr. Willis has also drawn my attention to a small clover-like plant—the roots of which bear the nitrogen-fixing tubercles—which he considers would be a most suitable plant to grow amongst tea.—G.

P.P.S.—Firstly.—The name of the weed suggested as suitable for cultivation amongst tea for the purpose of preventing wash and loss of soil is *Pilea microphylla* (not *Elatostemma* as stated in my last communication). I see that this plant has an asterisk beside its name in Trimen's Catalogue of the Fowering Plants of Ceylon—which indicates that the species is an introduced one and more or less naturalized in this country. I have frequently seen it grown in English greenhouses as an ornamental rock plant.

Secondly.—With reference to my suggestion that tea prunings might be pegged down along the upper side of each drain, to catch the soil. Since making the suggestion, I have tried the plan—and found it wanting in practice. It answers admirably as long as it lasts; but it is not sufficiently permanent. As the leaves and twigs decay, they get dispersed, assisted by the careless foot of the working cooly, who will not take the trouble to step over the trifling barrier.—G.

PLANTING NOTES.

Grow Fruit.—A Capetown farmer has obtained 36s. per 100 for fine peaches and 63s. for best pears. A prominent man has just purchased 11 adjoining farms near Paarl, and his first order has been for 200,000 trees.—*Natal Mercury.*

Coffee Planting in Columbia.—The vast production of coffee in Brazil is affecting coffee prospects everywhere. A consular report on the trade of Columbia contains the following from Barranquilla:—"Coffee cultivation has progressed favourably this year. Some 250,000 bags have been received in Barranquilla during 1896, against 190,000 bags during 1895. Of the coffee received this year about 214,000 sacks have been already shipped, and the remainder will be despatched within a couple of weeks. The coffee exported in 1896 is valued at £987,192. Growers have felt a certain degree of uneasiness on account of the depression in prices in foreign markets which has been experienced since the early part of this year. This depression is attributed to an excess of production in the Brazils. Fortunately the greater part of Columbian coffee is of the finer class, and the fall in price in it has not been so heavy as in the more ordinary qualities. The Government of Columbia has decreed a considerable reduction in the export duty paid on coffee, and should the decline in value continue this duty will be taken off altogether. The new coffee plantations alluded to in last year's report as being under operation in Tolima and Antioquia, will be proceeded with. On the slopes of Sierra Nevada, near Santa Marta, several large plantations are in course of formation, most of them aided by British capital.—*H. & C. Mail*, Aug. 20.

DENATURALIZATION OF SALT AND ITS USE IN AGRICULTURE.

We are now enabled to give the translation of some portions of the German papers sent to us by Mr. Coomaraswamy's friend, Herr Lange.

These papers consist of:—(1) The Law concerning the Levy of a Salt Tax for the North German Confederation; (2) The Ratification of the same by the several Confederated Powers by name, whereby it came into operation from Jan. 1st, 1868; (3) A pamphlet of 62 pages explaining in detail the carrying out of the Law for a Salt Levy of July 5th, 1888, with exact directions for the several parties concerned as to collection, valuation, exemptions, also giving sample forms for the various registers to be kept by the owners of mines and works or by the Customs' officers in charge of the Levy in the various States. These are prepared for a European country with abundant means for checking and testing at every turn, and could not be adopted here; but we give enough of the paper to enable one to see that the same principle might be applied under simpler forms.

Of course the most important question, from a local point of view, has reference to the denaturalization of salt. Are the agents prescribed available, and can they be practically applied locally? On this point we thought it well to have the opinion of our local Analytical Chemist, Mr. M. Cochran, and it is very satisfactory to learn from him that he sees no practical difficulty. He writes as follows:—

"Most of the substances mentioned for denaturalizing the salt for manuring purposes could be easily and economically applied in Ceylon in the proportions stated, more especially charcoal, coal dust, soot, coconut oil, sulphate of iron or green vitriol; the latter is a cheap substance and a manurial and disinfectant value are claimed for it besides."

It only now remains for the Tamil Representative, who has been the means of raising the present discussion by introducing us to his German fellow-traveller, to bring the whole question before the Legislative Council. He will no doubt be warmly supported by all the members interested in planting and agriculture, who, in a colony like this, we may say, include the whole Council, both official and unofficial.

Probably the wisest course would be for Mr. Coomaraswamy to propose a Sub-Committee of the Council to consider the question in its various issues—practical, fiscal and agricultural. Evidence could be taken from those best able to give the needful information and Papers could be examined, and the resulting Report would, we have no doubt, guide the Government in arriving at a fair and liberal decision on the whole question

Some little time ago, we mentioned how the discussion on using salt for agricultural purposes was first raised in the "sixties"; but we have now come on an earlier reference, being a letter from Mr. Tytler, dated 25th October 1855, which will be found reproduced on another page.

The translations from the German are as follows:—

LAW OF THE NORTH-GERMAN CONFEDERACY

(NO. 1) LAW CONCERNING THE LEVY OF A SALT TAX, OF OCT. 12TH, 1867.

We William, by the Grace of God King of Prussia, &c., order, in consequence of the agreement of May 8th, 1867, entered on by the States of the German Levy and Trade Union concerning a Salt Tax, we order the following law in the name of the North German Confederacy and Imperial Diet &c.:—

Abolition of the Salt Monopoly § I.

The exclusive right of the State (as now existing) to carry on the trade in Salt is herewith and hereby

Introduction of a Salt Tax § II.

Salt destined for inland consumption is subject to a tax of 2 *Thalers* per *cwt.*, nett weight, which where the Salt has been procured inland, must be paid by the producer or owner of the mine; but where the Salt has been brought in from other lands not belonging to the Confederacy, the introducer must pay the levy.

Under Salt (kitchen-salt) are included, beside the made or common and the sea-salt, all stuffs from which salt is usually separated; the head financial authority of any Confederate State is however empowered to allow such products to go free if there is no fear of a misuse of the same.

I. Tax on Inland Salt. I. Notice § III.

The procuring or refining of Salt is only permitted in the Salt Works, Mines and Refineries now existing and which have been at work at least six weeks before the promulgation of the law and shall have been announced to the Tax-Bureau of that district 6 weeks before; a similar announcement is necessary from the owners of Factories in which Salt in a pure or impure state is acquired as a by-product.

§.—IV.

Every owner of Salt Works or Factory already in operation, which produces Salt as a by-product, must, within a certain time, to be fixed by the Customs authorities of the district, present to the Head Office of the circuit, in duplicate, a description of and information concerning the manufactory, &c., and its dependencies. Every alteration in the premises as well as in the entrances and exits, as also in the appliances used and general arrangements is to be notified to the authorities before it is put into execution.

A similar duty devolves on any one wishing to establish new or to renew former works where Salt is produced, boiled, or refined, or obtained as a by-product, or on those wishing to start working a Salt, not hitherto traded in.

In building new Works or Refineries &c., the Ordinances of the levying authorities concerning fences &c., are to be observed, as also in erecting dwellings and sheds for the employés.

Where, according to existing regulations, deductions for rent for officials are made, the same must be paid by the Salt mine owner.

§.—V.

Every owner of new or restored Salt works is bound to bear the cost of the Customs watching of the same, if the total yearly out-put of the Salt does not amount to at least 12,000 cwt.

II. Control. §.—VI.

The institutions indicated in §. 3, are subject to the control of the Customs authorities, for the discovery of the made salt liable to duty, as also to prevent any defrauding as regards the trade and business connections; all necessary regulations and papers being obtainable from these authorities.

This control is exercised for each Salt Manufactory by a Salt-Tax-Administration specially appointed or directed. The Manufactories indicated in § 3 paragraph 2 are subject to the control of the nearest Customs' Administration.

§ VII.

According to the instructions indicated in the 6th section, every owner of Salt-works can be obliged by the Customs' authorities,—

1. To take care that the approach to the buildings for boiling and for drying, as well as to the chambers for sorting and breaking up, shall be easily overlooked and be protected by safe locks.
2. So to arrange the Salt Magazine that it shall be satisfactorily secured from forcible or secret with-

drawal of the Salt and to provide the authorities with necessary arrangements for the joiut locking of the places.

3. To keep the Salt only in the appointed and announced receptacles, spaces or chambers.

4. To keep exact books showing the Salt made and despatched, and to place these books before the Customs' Officer whenever required.

. . . .

[The enactments for the carrying out of the Tax are very detailed; the following are some of the points referred to:—Weighing of Salt in sacks; Control and Disposition of Inland Salt; Duties of owners of Salt-works; Withdrawing from the Depots: Allowances for Employees in Salt-works; Removal of Salt within fixed hours only; Monthly Statement of Salt-owners; 3 months' credit on sufficient security; Stores of Salt; Bonded Warehouses; Customs' treatment of Salt springs or Mineral springs, Baths, &c.; Foreign Salt how admitted and treated; Enumeration of objects freed from Salt tax; Products in Manufactories; Salt for Charitable Institutions free.]

EXEMPTIONS FROM SALT DUTY.

The preparation and sale of so-called Baths-Salt which is useless for human food is (under following conditions) free:—

1. The manufacturer must make no change in place or in utensils employed without consent of the Customs' officers.
2. He may keep the stores of this salt in one appointed place only.
3. He must follow his directions concerning approach and exit.
4. The Customs' officers must be admitted any hour of the day, and by night also when the boiling pans are in work.

Farther, rubbish from the salt works containing less than 36 p.c. of salt is quite free of control, and that containing less than 75 p.c. of salt is free, subject to various conditions.

The Customs' officers are to make periodic chemical examinations of the salt that is not being denaturalized and ascertain the exact proportion it contains of kitchen salt.

SALT USED FOR CURING OR PICKLING of herrings and other similar fish and for salting of other things intended for export is free of duty. The salt intended for the preserving of herrings is to be denaturalized with 6 Liter (quarts)* of herring brine to every 50 kilogram (110 lb.) of salt.

Salt may also be allowed free of duty for charitable institutions or in cases of immediate need.

The substances that can be used for DENATURALIZING SALT are the following:—

A. For salt which is to be used for AGRICULTURAL or manufacturing purposes.

(a) For salt destined for the feeding of cattle:

(aa) For that from made salt: ¼ per cent of oxide of iron and ¼ per cent wormwood powder,

(bb) For that made from rock salt ⅜ per cent oxide of iron and ¼ p.c. wormwood powder.

For the denaturalizing of salt, only such wormwood powder shall be allowed, as has been prepared according to directions and measures appointed by the Customs and has been locked up or taken in charge by them; it must also not be over two years old, dating from the time the raw weed was received.

(b) For so-called cattle-licking rock salt:

(aa) From made salt ¼ p.c. oxide of iron and ¼ p.c. charcoal powder,

(bb) From rock salt ⅜ p.c. oxide of iron and ¼ p.c. charcoal powder;

(c) For SALT FOR MANURE 1 p.c. of soot.

(d) For salt for manufacturing purposes:

(aa) From made salt: either ½ p.c. train oil or fish oil and ¼ p.c. iron oxide, or ½ p.c. train or fish oil and ¼ p.c. lamp-black,

(bb) From rock salt either ½ p.c. train oil and ⅜ p.c. iron oxide, or ½ p.c. train oil and ⅜ p.c. lamp-black.

* 6 liters=1·32 gallons.

B. One of the following denaturalizing agents can be employed for salt destined for manufacturing purposes or for manure: and which has come from inland salt works at which it had once been denaturalized.

The process can be attended to in the godowns of the recipient under Customs supervision. If none of the already named denaturalizing agents is suitable for the purpose intended, one of these following agents can be employed:—

(a) 1 *per cent* black oxide of manganese; (b) 1 p. c. smalt; (c) ¾ p. c. minium or vermillion*; (d) 2 p. c. finely powdered charcoal, peat, black oxide of manganese or coal-dust; (e) ½ p. c.—lamp black; (f) 1 p. c. soot; (g) 5 p. c. palm oil, COCONUT OIL or train oil; (h) 1 p. c. fine dried soap powder, after a previous testing of its purity according to directions already indicated; (i) 4 p. c. iron or copper vitriol; (k) 6 p. c. alum with ⅛ p. c. pine oil.

For *ordered* salt, if necessary, some of the following agents may be employed by the Customs' officers:—½ p. c. mineral oil (peat oil); ¼ p. c. red oxide of iron in combination with 0.05 p. c. animal oil; 2 p. c. sulphuric acid (of 66 °B. diluted with 3 to 4 parts water), or also only 1 p. c. sulphuric acid of 66 °B. with 1 p. c. water, if the salt is for a *bona fide* manufacturing purpose, and if no other agent can be employed; 2 p. c. strong fuming muriatic acid; 2 p. c pink salt†; 1½ p. c. chloride of tin.

Salt refuse can only be given for agricultural and other purposes free of duty when it has been denaturalized, in one of the ways indicated. Solid pieces like pan-stones must be denaturalized in the same way as rock-salt. Unbroken lumps can only be allowed to individual planters or manufacturers under the following conditions:—

1. The delivery of the same requires the consent of the Customs' authorities. Detailed information of purpose for which used, &c., &c., is required on penalty of forfeiting the privilege, unless every requirement is fulfilled.
2. Those who require the salt for cattle fodder, must state exactly number of cattle kept, &c., and fulfil various other regulations.

CEYLON TEA IN AMERICA: AN INTERVIEW WITH THE LADY DEMONSTRATOR.

"Well," she said, "You may grumble about heat, but I can assure you it was a good deal worse in America than this when I left. My customers were going in pretty largely for *iced* tea then. However I will begin at the beginning, and tell you all I can think of about the tea enterprise as I have to deal with it. I am working under J. H. Parke & Co., the advertisers of the Gold Camel blend. Here you see"—she continued, taking in her hand a tiny two-inch little tin box, daintily got up with a gaudy picture of the gold camel on the lid, and a paper of instructions fastened by an elastic strap to the under side "is our sample tin. There is enough tea here for two infusions, and the paper accompanying every box tells exactly how to make it. Well, when I am going to a place to give a demonstration, we first send out a number of circulars saying, I shall be at such and such a store on a certain day. If it is in Philadelphia or anywhere near we send out also our waggon, which

* With regard to minium or vermillion, the German word "menuig" certainly has both these meanings, and yet they are totally different substances. Minium is "red lead," *i.e.*, an oxide of the common metal lead; vermillion is a red sulphide of mercury. Mennig also stands for cinnabar, the chief ore of mercury of which vermillion is a purified form.—M. COCHRAN.

† Pink salt is a double chloride of tin and of ammonium used by dyers.—M. COCHRAN.

is a very pretty one. It is dark blue with medallions on the sides. Each medallion contains a looking glass, in the centre of which is painted a gold camel and the names of Ceylon and India are also printed. There is an electric bell under this carriage which never stops ringing all the time the waggon moves, and wherever it stops crowds collect to look or to find out where this bell is hidden. The driver wears a scarlet coat, and the horse is a good one, and altogether our waggon attracts notice where it goes. I have it drawn up before the store where my demonstration is going on, which of course brings people about the door. That pleases the store proprietor as well as ourselves, you see. Then if possible I get a window, or part of one in the store, and that I fill up with our advertisements and samples. Next I try always to have my table or counter, or whatever it is that is given me, as near the door as I can, so that I may catch the customers as they pass in and out and set out with flowers, etc., as prettily as possible. Also as you know everybody is equal in America. An assistant is as good as his master, and so I pay far more attention to the people behind the counter than to the proprietors, for it is the men selling other goods who will sell our tea. The first thing I do on entering a store and taking up my stand there, I give every assistant in the place a sample tin. I tell them whenever they are thirsty just to come to the table, and there will always be a cup of tea ready for them. At dinner time there are always probably some who take their meals on the premises, and for them I make a big jug of iced tea, or hot tea just according to the weather, or I give them all an afternoon cup if they prefer that. Of course these little attentions please them, and put them in good humour, and then when customers come they are willing to help the sales if they can, and push our tea a little."

"Now that sounds rather like bribery and corruption to me," I interposed. "However go on."

"It isn't really," she laughed back, "but I won't deny I think it helps us a good deal sometimes. Well, then, the customers come in to buy other goods, and I invite them to come to my table and have a cup of tea before they leave. They are generally quite pleased to do so and I give it to them with sugar and plenty of good cream, or else with a lemon if they prefer it that way, or iced—just as they like. There are bowls of crackers (all biscuits are crackers over there) and I tell them to help themselves; they are welcome to just what they like at the table. Then I tell them while they are drinking it, how Ceylon tea is made, and all the different processes. I describe the plant, and how it is plucked, the withering, drying, firing and all the rest of it; and impress on them how clean the manufacture of Ceylon and Indian tea is compared with that of China or Japan, and how much nice it is when done by machinery and not hand. They generally ask a lot of questions and are quite interested. Perhaps they will say they have tried it before, but they did not like it; that it tasted like poison, and so on. Then I ask them how they prepared it, and very often I am told that a handful of tea leaves was put in the pan and boiled with the water, or else that the same quantity was dropped into the teapot, and then the pot allowed to stand from two to four hours on the stove. I assure you," she went on, seeing my look of incredulity, "that is no uncommon way of making tea in America, and then they come and say they don't like it, it is so bitter. You can just fancy what Ceylon tea would taste like heated in that fashion. That is my opportunity. I show them they have gone the wrong way to work altogether, and tell them the right manner of infusion—how much tea to put in, how long to let it stand, and all that, and then I wind up by giving them a sample tin and asking them to try it. There is enough for twice, and I ask them it they do not like the tea the first time to give it a second trial. Generally by the time, they have done so, they like it, and are quite willing to come back to the store and buy. But I forgot to tell you that we have other attractions. Besides the sample tins and our smart waggon with the bell always going we have a phonograph which sings songs and talks up Ceylon tea. Lots of people come to hear that. Then I always keep a supply of pretty cards with pictures about tea making, to give away to the children. Every child who comes in, gets one, and wherever I go I stick up in the window a big toy camel which wags backwards and forwards, and is a famous advertisement for our tea. You see in America we have a great deal of prejudice to overcome. The people are not tea drinkers but coffee drinkers, and you have really to teach them to take tea. Now to show you what I mean by that, I went to Reading once. That is a coal district, and I found the miners took far more tea than any place I had been in. They had never learned to drink coffee, and so there was no obstacle to our sales.

"And what do you charge for your tea over there?"

"Well, we start at 60 cents a pound—that equals about 2s 6d—and go up, but I don't believe there is any more profit, for charges are as you know, higher with us."

PRODUCE AND PLANTING.

The Treatment of Tea in London Warehouses —We published a letter last week on this subject from "An Anxious Planter." It is a matter, we know, that exercises the minds of a great many planters, and one which sooner or later must occupy the attention of the Tea Association. Like other reformers who cannot understand why certain hindrances to the public welfare are permitted to flourish, our correspondent is puzzled to know why the tea industry generally does nothing to mitigate the evils attending the repacking of tea in the London warehouses. He calls attention to the fact that machinery for tea packing is in existence, but for reasons best known to themselves most of the warehouse authorties ignore these machines. It is not in our province to advise experienced men of business how they should carry on their business operations, nor do we wish to infer that in some instances no earnest desire had been made to meet the requirements of the trade and the public in the matter. If in some of the warehouses antiquated methods are preferred, that is the affair of the proprietors of these warehouses. It is our province, however, to give publicity to the legitimate complaints of planters against those who handle their teas, and to ventilate a subject which needs light. There is one point in connection with this repacking question which must not be lost sight of. It is bound up with the duty question. The demand for the removal of duty on tea must come from the consumer say the representatives of the planters, some of whom are not even in favour of abolition. That is a fair way of looking at it,

Therefore it behoves those who handle to see that the re-packing at the warehouse is carried out under the best possible conditions, so far as the public are concerned. It would be awkward for the warehouse authorities if the consumers of tea were to couple the economic phase of the question with another reason when they demand, as they may do before long, the abolition of the tea duty. It would be a factor in the situation that would certainly count with the public if all the facts as to the present methods of repacking tea before it finds its way into the hands of the dealers were known, and saw the light in the guise of a new sensation. We have no desire to exaggerate the details, nor do we hold a brief for the consumer in the matter. We merely call the attention of those concerned to the complaints of tea growers on the subject, and accompany the notice with a hint that the matter well deserves attention before it enters, as it may do, on an acute and unpleasant stage.—*H. and C. Mail*, Aug. 6.

THE CONSOLIDATED TEA AND LANDS COMPANY, LIMITED.

The first ordinary general meeting of the shareholders of this Company was held on 30th ultimo, in the Accountants' Hall, Glasgow, Sir John Muir, Bart, presiding.

PROFITS.

The Chairman said:—We have much pleasure in submitting to you the accounts of the past season, which show a credit balance, exclusive of profits made in sales of land, of £112,228, or £18,252 more than the average profits in the prospectus. Over and above this profit made on tea-trading we also show a profit made on the sale of the Travancore property of £63,162 4s or altogether a profit for the year of £175,380 19d. This enables us to pay dividends at the rate of 5 per cent. and 7 per cent. on the preference shares of both classes, to pay the interest due to the vendors, to propose a dividend of 10 per cent. on the ordinary shares, to pass £65,000 to a reserve fund, and to carry forward to next year £14,236 5s 4d. These figures speak for themselves, and I need not detain you further on the subject of the accounts. During the year under review we have added 4,827½ acres to the area of cultivation, and we are engaged in opening up a further area of 4,337 acres during the current year. You will observe that our crop for 1896 show a substantial increase over the previous year, and so far as we can gather from the advices from the estates, this quantity will be again increased in the current year. The new extensions consist not only of tea, but of coffee, cocoa, coconuts, and india rubber. We wish to encourage the growth of these products other than tea as much as possible, so as not to have all our eggs in one basket. In addition to this, the tea extensions we are making are practically all on lands capable of producing high quality tea, such as Upper Assam and the Travancore Hills. We are sure this is a wise policy. We are not disposed at present to extend our area of medium tea, as we think it possible there may be in the future an over-supply of this class of tea, whilst we think the demand for the higher qualities of tea is likely to increase.

OVER-PRODUCTION.

The Chairman of the Dooars Company has recently pointed out a possible danger to the tea industry in over-production, and this is, in our opinion, a real danger so far as concerns medium and common teas. On the other hand, everything points to the maintenance of prices for really good quality teas, and these are the teas we intend specially to cultivate and to extend. Of course, increased production in medium teas may be met as heretofore by increased consumption and new outlets. China tea is now, however, almost entirely displaced in Great Britain, and consequently, unless energy is shown in opening up new markets, a glut of medium teas in the home market may arise.

The subject of possible over-supply of medium teas is occupying our attention, and the remedies we are encouraging are: 1. Economy in working; 2. Increased production of high quality tea; 3. The opening up of new markets. In regard to the latter, I am pleased to tell you that this company has sold in the United States and Canada during the past year more than two million pounds weight. It may interest you if I give our figures of sales in previous years in these countries on account of the North and South Sylhet Tea Companies, Limited, whose properties, including their American business, were acquired by this company:—1893, 707,200 lb; 1894, 1,288,147 lb; 1885, 1,591,324 lb; 1896, 2,099,784 lb; six months—1897. 1,665,044 lb. I think you will admit that this shows gratifying progress.

PUSHING TEA IN RUSSIA.

In addition to this I am glad to tell you we have recently made satisfactory arrangements for the pushing of British-grown teas on a large scale in Russia, and I hope at future meetings to report to you encouraging progress in this direction. These statements will, I think, satisfy you that the Consolidated Company is doing its duty in increasing in every legitimate way the opening up of new markets.

THE EARTHQUAKE.

As you are aware, a severe shock of earthquake passed over the tea districts last month, and fears were entertained, from the first account received, that the crop prospects for the year would be seriously affected by the damage done; but I am glad to inform you that the picking of crop has not been stopped for a single day on any of the company's estates, and energetic steps have been taken by the management to repair the damage done to bungalows, houses, and other buildings, so that we are able to report to you that the company has sustained no loss which cannot promptly be replaced, and, as already stated, we have suffered no loss of crop.

AMALGAMATION.

Regarding the sale of the North Travancore lands you are aware the company owned a large tract of very valuable high-country land in this district—more than it would have been possible for us to utilise profitably by ourselves. As foreshadowed in the prospectus, it was at first our intention to sell some of this land, or to form subsidiary companies for working part of it. After careful inquiry, however, we came to the conclusion that the introduction of outside elements would be detrimental to the company's interests. The only alternatives, therefore, were either to create new capital and work the whole of it ourselves, or to combine with others for that purpose. We felt, under all the circumstances, the latter would be the wiser course, and we accordingly came to an understanding with the Amalgamated Tea Estates Company (in which company most of the Consolidated Company's shareholders are interested) to work the whole of the Travancore lands on joint and equal account. To carry this out effectively a new company was formed, called the Kanan Devan Hills Produce Company, Limited, in which the two companies are the shareholders. The property was taken over from this company by the new company at a valuation arrived at by two experienced experts, Mr. W. Milne and Mr. L. Davidson, and the transaction showed a profit to the Consolidated Company of £63,152 4s. I have no doubt this powerful combination will lead to better results than if we had endeavoured to work single-handed. We have also entered into an arrangement with the East India and Ceylon Tea Company, Limited, to amalgamate the two companies' interests in the Bambarabotua district of Ceylon. This will be done through the formation of the Hopewell Tea Company, Limited, in which this company will have a two-third interest, and the East India and Ceylon Tea Company, Limited, one-third. This amalgamation will lead to more profitable working than if the two companies remained as active competitors in the same district. The properties of both companies will be taken over at a valuation to be arrived at on September 15th, and the result will appear in the current year's accounts. I am satisfied we should in every way encourage

combinations such as these, as they tend to keep down rates and reduce the cost of management. I am glad to have the opportunity of stating that the companies' superintendents, managers, and assistants are working well, and have as a rule given us satisfaction. I do not think I need detain you any longer.

I am happy to be able to give you so satisfactory an account of our first year's working, and, whilst we must expect ups and downs sometimes, I trust when we next meet I shall have an equally satisfactory report to make. I have pleasure in proposing the following resolution :—" That the balance-sheet and profit and loss account for the year ending November 30th, 1896, with the auditors' certificate and the directors' report thereon, be and the same are hereby received, approved, and adopted ; that the dividend at the rate of 5 per cent., less income tax, paid to November 30th, 1896, on the first preference shares of the company be and the same is hereby confirmed ; that a dividend at the rate of 7 per cent, less income tax, to November 30th, 1896, on the second preference shares of the company be now sanctioned and declared ; and that a dividend of ten per cent, less income-tax payable August 14th next, be now sanctioned and declared out of the balance of the profits of the year on the amount paid upon the ordinary shares of the company, £65,000 placed to credit of a reserve fund, and the balance of £14,236 5s 4d carried forward to next year.

Mr. Buchanan seconded the resolution, and Mr. Carritt, in the course of a few remarks expressed approval of the steps which the directors were taking in the way of increasing the growth of fine teas, selling the Travancore property, and extending the trade to Russia.

The motion was unanimously adopted. The auditors were reappointed, and after a vote of thanks had been passed to the chairman, the proceedings terminated.—*Glasgow Paper.*

INDIAN PATENTS.

Aug. 21.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, in the office of the Secretary appointed under that Act, during the week ending 7th August 1897 :—

Improvements in Apparatus for the Drying or other Treatment of Tea Leaf.—No. 306 of 1897.—Samuel Cleland Davidson, merchant, of Sirocco Engineering Works, Belfast, for improvements in apparatus for the drying or other treatment of tea leaf, tobacco leaf, grain, malt, fruits and other substances.

Improvements in the Method of and Apparatus for Extracting Oil from Seeds.—No. 448 of 1896.—William Robert Harrison, consulting engineer, and Edwin Stephenson, oil refiner, both of Hull in the county of York, for improvements in the method of and apparatus for extracting oil from seeds or other oleaginous substances. (Specification filed 2nd Aug. 1897.)

Improvements in Tea-Rolling Machines.—No. 333 of 1892.—John Brown, engineer, of London, for improvements in tea-rolling machines. (From 7th Aug. 1897 to 7th Aug. 1898.—*Indian and Eastern Engineer.*

THE HISTORY OF THE SWEET PEA,—SUPPOSED NATIVITY IN CEYLON.

In the *Florist's Exchange* for July 17, Mr. S. B. Dicks contributes an article on this subject, with illustrations copied from some of the older books. Mr. Dicks traces the sweet pea to John Bauhin's *Historia*, 1650. The plant itself is a native of Sicily, but one form of it was considered to have come from Ceylon, and was accordingly called by Burmann, Lathyrus-zeylanicus. The word "nobis," which has misled Mr. Dicks, of course applies to Burmann himself! How the mistake arose of considering the Sweet Pea as a native of Ceylon, we cannot tell. For those with leisure, it would, no doubt, form an interesting subject of enquiry. It is certain that neither Baker, in Hooker's *Flora of British India*, nor Trimen in *Handbook to the Flora of Ceylon*, admits the plant as a native of the island, though it is likely to have been taken there.—*Gardener's Chronicle*, Aug. 7.

VALUE OF TEAK.

In an article in *Timber* (London) on the value of teak for structural and mechanical purposes, the claim is put forth that such wood is really the most durable timber known and of especial importance to shipbuilders, being very hard, very light, easily worked, and, though porous, strong and lasting. It is soon seasoned, shrinks but little, and on account of its oily nature does not injure iron. In southeastern Asia it is not only considered the best material for ship construction, but for house carpentry and other work where strength and other lasting qualities are required. It is rarely attacked by ants of the white species, and its rare durability renders it specially valuable in a climate like that of India, where the elements causing decay are so numerous and powerful, where dampness brings on rapid decomposition, and where the white ant devours without scruple. In the operation of cutting this wood is frequently girdled one or two years before it is felled.

CITRONELLA OIL.

Mr. J. C. Umney communicated, in a skilful abstract of his paper at the 34th annual meeting of the British Pharmaceutical Conference held at Glasgow from August 9th to 12th, the interesting fact that the native distilled oil of citronella has not so high a specific gravity as that distilled by two English firms in the East :—

He and Mr. R. S. Swinton have investigated the reasons for the difference, and find that the native oil contains a large percentage of a heavy and high-boiling sesquiterpene, which reduces considerably the odour value. The "English" oil is of finer aroma on this account, and Mr. Umney explained that the low specific gravity of the native oil is not an indication of impurity. The difference referred to is probably due to the use of steam-heat by the English firms in distilling, and of fire-heat by the natives; at any rate lavender oil distilled by steam is found to be of much finer odour than the oil distilled by fire-heat as done at Mitcham. Mr. Umney also mentioned that Sir Walter Gilbey is experimenting in the cultivation of lavender at Elsenham, in Essex.—*Chemist and Druggist.*

THE SCHOOL OF FORESTRY, CEYLON.

This school started work on the 15th of April with six students (a limited number), three of whom were drafted from the Forest Department, and the remaining three selected from the students of the School of Agriculture after competitive examination. The following is a list of the subjects taught, with the names of the teachers annexed :—

Forestry .. Mr. Broun, Conservator of Forests.
Mathematics.. Mr. Walter Parys,
Forest Law .. Mr. F. M. de Saram, Advocate.
Surveying .. Mr. Dyson Blair.
Botany .. Mr. Drieberg, Superintendent, School of Agriculture.

The course of trainingas at present arranged covers one year. During the atter part of the year the students were taken on 1 tour by the Conservator of

Forests himself. The tour occupied about six weeks, during which period many of the forests of the North-Western and Central Provinces that lie on the route between Kurunegala, Dambulla, and Matale were traversed, while visits were also paid to the Galhoda, Nanu-oya, and Nuwara Eliya plantations. The six students who will be the first trained in the Forestry School are Messrs. Jansz, Jayman, and Galagoda of the Forest Department, and Messrs. Fernando, Mendis, and Ratnayak from the School of Agriculture. —*Report of Mr. C. Drieberg, Superintendent of School of Agriculture.*

HOW TO DEAL WITH LOCUSTS.

A LOCUST-DESTROYING FUNGUS.

In connection with the question of remedies and devices for the destruction of locusts, Dr. Edington of the Bacteriological Institute, Graham's Town, has prepared a fungus, experiments with which have been made by Messrs. Acutt and Crew, farmers in the Buluwayo district, which have proved highly satisfactory. Samples of the toxic preparation may be obtained *gratis* through the various Civil Commissioners in Cape Colony, with instructions as to its use. Of its efficacy, Mr. E. Roos-Townsend, Civil Commissioner at Buluwayo, in asking for a fresh supply, says :—

"I have distributed the tubes as widely as possible, and the universal opinion is that the results are most satisfactory, and there is a large demand for a further supply. The protracted drought has somewhat handicapped the experiment; nevertheless, it has been so successful that one can fairly assume that, given favourable conditions, *i.e.*, damp weather, the results would be most satisfactory. Hitherto experiments have been confined to the 'voet-ganger' stage of the pest. These are more easily dealt with, and the results can be more closely watched. Unfortunately we have not had sufficient of the fungus to make any perceptible impression on the myriads of the insects which have been hatching throughout the country. Had we sufficient toxin, I think we should be able to make use of it to a large extent in setling many of the native troubles, for those who have seen its satisfactory results regard the power of the white man with superstitious awe, and look to us to root out this pest which has so persistently taken their crops ever since the white man came into their country in 1890.—*Home paper.*

THE AMSTERDAM CINCHONA MARKET.

Our Amsterdam correspondent writes, under date of August 4, that the auctions to be held on August 26th will consist of 5,448 bags, and 654 cases Java bark. The stock in first hands, including the above quantity, consists of 2,163 cases Government, and 6,739 cases private, bark. The shipments from Java during June have been declared as follows (in Amsterdam lbs.) :—

	1897	1896	1895	1894	1893
July	900,000	1,074,000	548,000	953,000	680,000
Jan.-July	4,308,000	5,050,000	4,316,000	4,701,000	4,740,000

It will be seen that the shipments are smaller than at the corresponding period of last year, whilst it must not be overlooked that in the meantime the stocks in Amsterdam have greatly diminished. The feeling is firm, and a good demand is looked for at the coming sales.—*Chemist and Druggist.*

INDIAN PATENTS.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, in the office of the Secretary appointed under that Act, during the week ending 14th August 1897 :—

Rotary sifter for tea or other material.—No. 317 of 1897.—E. Pauling, engineer, of Khobong tea estate, Jalup P, O., Dibrugarh, Assam for a rotary sifter for tea or other material.

The fees prescribed in Schedule 4 of Act V of 1888 have been paid for the continuance of exclusive privilege in respect of the undermentioned inventions for the periods shown against each :—

Cleaning and polishing rice—No. 17 of 1892. Christian Ludwig Meloseh, millowner and dealer in rice, of Chetla hât, Alipore, Twenty-four Pergunnahs, Bengal, for cleaning and polishing rice. (From 16th August 1897 to 16th August 1898.) —*Indian and Eastern Engineer*, Aug. 28.

PERAK.

EXPORT PRICES OF COFFEE AND GUTTA FOR JULY.

Liberian Coffee. $22 to $23 per pikul.

India Rubber, First quality, $145 to $155 per pikul.

" Second quality, $105 to $115 per pikul

Gutta Percha, First quality, $300 to $325 per pikul.

" Second quality, $280 to $290 per pikul.

Perak Government Gazette.

PLANTING NOTES.

Rubber from the Australian Tropics.—The enormous increase in the price of rubber within the last ten years has led to the cultivation of the plant in many new countries. Certain British chemists are now visiting the rubber-producing countries in South America with a view to improve the quality of the product, and in Queensland, New South Wales, and South Australia inquiries are being made as to the possibilities of the industry. Mr. Maurice Holtze, then director of the Port Darwin Botanic Garden, in 1888 advocated the planting out of Ceara rubber and Para rubber trees in the Government forests. At present it is said that a wealthy London firm are about to start rubber-planting on a very large scale in Bathurst Island, to the north of Port Darwin.—*Chemist and Druggist* Aug. 14.

Kola Nut Cultivation.—A planter asks for information in respect of this new product, and we have referred him to the *T.A.* volumes and our "planting review" for the best summary of what has been done locally. We believe there is a good demand: the latest quotation is about 3d a lb. Here is a further reference to Kola or Cola nuts :—

C. acuminata grows about forty feet high, and bears pale yellow flowers spotted with purple; its leaves are about six or eight inches long, and pointed at both ends. Under the name of Cola, or Kolla, or Goora nuts, the seeds of this tree are extensively used as a sort of condiment by the natives of western and central tropical Africa; and likewise by the negroes in the West Indies and Brazil, by whom the tree has been introduced into those countries. In Western Africa the trees grow mostly in the vicinity of the coast, and an extensive trade is carried on in Cola nuts with the natives of the interior; the practice of eating Cola extending as far as Fezzan and Tripoli. A small piece of one of these seeds is chewed befor each meal as a promoter of digestion; it is also supposed to prove the flavour of anything eaten after it, and even to render half putrid water drinkable. There are several varieties of Cola nuts; the common kind has an astringent taste. [The Bitter Cola of Fernando Po is the produce of some guttiferous tree, as yet not identified.] Powdered Cola is applied to cuts.

COFFEE AND PEPPER EXPORTS FROM SOUTHERN INDIA:

GREAT FALLING-OFF IN COFFEE AND INCREASE IN PEPPER;

"LADYBIRD" BEETLES WANTED TO SAVE COFFEE;

WHY NOT CULTIVATE PEPPER FREELY IN CEYLON?

We are once again indebted to our old friend, Mr. Ralph Tatham (agent on the West Coast of India for Messrs. Arbuthnot & Co.) for the Annual Statement of Coffee and Pepper Exports from Southern India. His letter and full detailed table will be found as a Supplement on opposite page, and are worthy of the attention of all who take an interest in our old staple and in the second product—Pepper—which was once a leading export from Ceylon, and which ought to be a good deal more cultivated than it is in our Western Province and especially in the Kegalla district where "pepper" reigned supreme in the times of the Dutch and the early part of the present century. Planters, even in the Kelani Valley, are on the lookout for another "string to their bow" and have been testing Liberian coffee, &c.,—why not then try pepper? What good reason can be given why Southern India should export in one year as much as 222,383 cwt. of pepper valued at nearly four million of rupees; while Ceylon last year exported only a miserable 374 cwt. worth ten thousand rupees? The Dutch had an export rising from 4,000 to 5,000 cwt., chiefly picked in the Kegalla and Hanwella districts, and Governor Van Imhoff in 1740 considered that pepper was a far more important product for cultivation in Ceylon than either cardamoms or coffee, and that the natives should be induced to greatly extend the industry in this spice which might in course of time be made to rival its far-famed sister spice, Ceylon cinnamon. Now that the Governor is visiting the Kegalla district and that both His Excellency and the planters want to ensure a steady and increasing traffic for the new Kelani railway, we trust attention will be turned to this time-honored and very profitable product so long peculiar to the said Kegalla district. The case is one where the Director of the Botanic Gardens might well be asked, in conjunction with the Assistant Agent of the district and the local Planters' Association, to inquire how best the culture of pepper can be revived in native gardens, and introduced into European plantations in Kegalla and Ratnapura districts as also in adjacent portions of the Western Province.

Turning to coffee, Mr. Tatham has but a poor account to furnish and we much fear it is "the beginning of the end" for this staple in Mysore and Coorg as it was in the "eighties" in Ceylon. The conditions described at the recent meeting of the United Planters' Association of Southern India, exactly coincide with the experience of Uva—our driest and richest district in this island—a few years back. Until then, coffee in Uva had kept up against leaf disease; but when "green bug" appeared the planters found they had a far more terrible enemy to contend with and gradually nearly every one of them had to give up the struggle. The only chance we can see for coffee in Mysore and Coorg lies in the introduction of the "lady-bird" beetles to eat off the pernicious bug as they, apparently, have done, from the coffee of the Hawaiian islands. Our latest information on the subject from Mr. E. E. Green—to whom we referred some papers—is encouraging. We quote as follows from Mr. Green's letter:—

> The correspondence between the Government of Madras and the Commissioner of Agriculture to the Hawaiian Government bears high testimony to the value of Mr. Koebele's work in the introduction of "Lady bird" beetles and other beneficial insects. I think you have already published the Commissioner's letter in reply to the enquiries of the Madras Government. He states that Mr. Koebele's services would be unavailable for at least two or three years to come. (They appreciate the value of his work too much to part with him in a hurry). But the Commissioner is making enquiries in the United States for other trained entomologists who might be willing to undertake the work. If anything is to be done—it should be done quickly—or there will be little coffee left to benefit. I have by this last mail received a letter from Mr. Alexander Craw, quarantine officer and entomologist to the State Board of Horticulture, California. He writes:—"Our new lady-birds are doing splendid work, and especially *Rhizobius Ventralis* on *Lecaniums*, that there was so much adverse criticism about when we first distributed them. Two weeks ago I sent Dr. L. O. Howard two good sized boxes of *Vedalia Cardinalis* and *Novius Kœbelii* to send to Egypt."

We commend this important information to the attention of Mr Tatham, his principals Messrs. Arbuthnot & Co., and to all others interested in the maintenannce of coffee in Southern India, and also to the few proprietors who have fields of the old staple still remaining in Ceylon. It will be a great pity if the opportunity is lost of giving a fair trial to the lady-bird beetle against the "green bug" before any coffee left both here and in Mysore and Coorg, is weakened beyond recovery.

"HOW TO ECONOMISE LABOUR."—A proprietary planter thus expresses his opinion in reference to the series of letters now appearing in our columns:—"I think this series of questions will prove most interesting and useful. There is no doubt that some stirring up of the mental soil is wanted in these directions. There has, no doubt, been a tendency to keep too long in a groove, especially with regard to weeding. We have come to look upon the existing state of things in the same way as formerly they accepted the flatness and fixity of the earth. Did anything practical ever come of that single-rail railway in Ireland? Something of that nature might be a saving in cost and suitable in Ceylon. If it could be laid down cheaply enough, some modification of the 'Switchback' might be practical. But Government ought to do more in the matter of providing cart roads to stations. By estate path I am under four miles from the station; by cart road 8½, *two and a-half of which* I have *to carry my tea and everything else on coolies' heads.* For the last few months, I have been unable to take my horse to the station on account of the bridges. [Now there is a very good trace for a cart road to the station, which would join the estates from the Dimbula Gap by a loop road. Sackville was very keen on this being carried through, but got no support, and so it remains.] Cuscus grass I do not know, but if it neither seeds nor spreads it would act very beneficially in preventing loss of soil if planted above drains. My coolies are allowed all the garden room in a reasonable way they wish, but what they do not like is *transport.*"

COFFEE AND PEPPER EXPORTS FROM SOUTHERN INDIA, 1896-97.

Dear Sir,—I have the pleasure to furnish you with my Annual Statement of Exports of Coffee and Pepper for the year ending 30th June 1897, the total figures of which approximately represent the crops of these products in India for the year in question. I further show the distribution of shipments to foreign ports. I have also added the figures relating to exports for the two previous years for the purpose of comparison.

Coffee.—The crop of 1896-97 was remarkable as being the smallest exported from India for many years, the total quantity not exceeding cwt. 211,760, or some thirty-one per cent less than the previous crop, which itself was not a good one. Of the quantity shipped this past year cwt. 117,182 may be regarded as Plantation, and the balance cwt. 94,578 as Native Coffee, the value of the former being R7,968,376 and of the latter R5,580,102, calculated at R68 and R59 per cwt. respectively, which I consider an average value for the year, allowing for the difference in prices obtained for the produce of the several districts in which the crops were grown. The total value of past year's crop may therefore be taken at R13,548,478 as against that of last year, which I estimated at R22,461,857, but as already shown last year's crop compared unfavorably in quantity with that of the previous year and in addition the Coffee Market was weaker to the extent of an average of some nine rupees per cwt. The considerable reduction in the export from the ports of Mangalore, Tellicherry, Calicut and Madras point to the fact that the crops in the districts of Mysore, Coorg and the Nelliampathies, which find their outlet at the ports in question were exceptionally short; whereas judging from the shipments from Beypore the crops from the Neilgherries and Shevaroys greater than those of the previous year.

Pepper.—The total exports of this spice amounted to cwt. 222,383, or some forty-one per cent in excess of what was shipped last year, the value of which at an average of R17-8 per cwt. amounts to R3,891,702. The shipments from Tellicherry were the largest.—I am, dear sir, yours faithfully,

RALPH TATHAM, Agent to Arbuthnot & Co.

Tellicherry, 23rd August 1897.

MESSRS. ARBUTHNOT & COMPANY'S ANNUAL STATEMENT OF EXPORTS OF COFFEE AND PEPPER FROM SOUTHERN INDIA DURING THE SEASON ENDING 30TH JUNE 1897.

From / To	Mangalore. Coffee. Plan.	Mangalore. Coffee. Nat.	Mangalore. Coffee. Total	Mangalore. Pepper.	Cannanore. Coffee	Cannanore. Pepper	Tellicherry. Coffee. Plant.	Tellicherry. Coffee. Nat.	Tellicherry. Coffee. Total.	Tellicherry. Pepper.	Badagara. Coffee	Badagara. Pepper.
London Cwt.	23,901	..	23,901	210	..	...	12,974	...	12,074	9,194	..	..
Liverpool ,,	...	...	...	...	...	...	...	...	...	500	..	..
Marseilles ,,	...	9,768	9,768	...	...	...	13	2,098	2,711	...	..	..
Havre ,,	...	18,958	18,958	600	..	...	1,227	28,567	29,794	85,675	..	..
Bordeaux ,,	...	400	400	...	...	...	...	...	..	22	...	..
Nantes ,,	...	100	100	..	...	..	...	..	..	..	...	..
Trieste ,,	1,122	...	1,122	..	...	..	2,034	7	2,041	1,000	...	..
Genoa ,,	...	...	...	..	...	..	...	..	..	700	..	...
Leghorn ,,	...	...	...	..		...	...	...	...	100	..	..
Ancona ,,	...	...	...	...	...	...	..	...	...	2.250	..	..
Messina ,,	...	...	...	..	...	...	...	..	...	63	...	...
Naples ,,	...	...	...	...	..	...	...	..	...	1,775	...	:
Venice ,,	...	...	...	...	...	...	...	101	101	...	..	..
Hamburg ,,	1,373	...	1,373	...	...	...	1,733	3	1,736	7,968	..	...
Antwerp ,,	...	405	405	..	...	...	113	2,219	2,332	400	...	..
Sydney ,,	...	...	...	...	...	...	100	...	100	...	...	..
Melbourne,,	286	450	736	...	...	...	283	21	304	..	...	...
Brisbane ,,	116	...	110	...	..	...	..	..	..	..	...	...
Auckland ,,	...	...	...	...	...	...	...	...	..	...	..	...
Chicago ,,	...	...	...	...	...	...	...	...	..	..	..	..
Turkish, African, Arabn. and Persian Gulf Ports,,	...	10,413	10.413	141	...	702	...	425	425	054	..	...
Bombay other Indian Ports,,	141	15,917	10,058	1336	3	51,390	111	2,107	2,308	23,250	..	20,623
Ceylon	...	...	...	...	...	86	1	711	712	..	...	..
Cwt	20,930	56,411	83,350	2287	3	52,178	18,580	36,949	55,538	113551	..	20,623
Less Imports	..	..	..	...	...	..	4,794	12,800	17,594	44,033	..	...
1896-97	26,039	56,411	83,359	2287	3	52,178	13,705	24,149	37,944	69,518	..	20,023
1895-96	47,206	81,169	1,28,375	2071	...	26,366	23,424	33.656	[illegible]	62,623	...	7,919
1894-95	41,370	70,070	1,12,349	1010	2	28,890	20,688	13,808	31,496	40,178	...	5,867

From / To	Calicut. Coffee. Plant.	Calicut. Coffee. Nat.	Calicut. Coffee. Total	Calicut. Pepper.	Beypore. Coffee. Plan.	Beypore. Coffee. Nat.	Beypore. Coffee. Total	Beypore. Pepper.	Cochin. Coffee. Plan.	Cochin. Coffee. Nat.	Cochin. Coffee. Total	Cochin. Pepper.
London Cwt.	23,778	54	23,832	634	23,964	...	23,964	...	531	...	531	9,308
Liverpool ,,	3	..	3	...	...	...	...	...	...	...	...	...
Marseilles ,,	1	50	51	..	...	...	...	...	..	...	...	...
Havre ,,	1,597	3,378	4,975	9,350	...	...	...	...	...	...	...	3,500
Bordeaux ,,	...	..	..	...	...	...	...	...	...	...	...	...
Nantes ,,	...	..	..	...	...	...	...	...	...	...	...	..
Trieste ,,	926	..	026	...	1,750	...	1,750	...	...	...	...	...
Genoa ,,	..	...	..	200	..	...	...	...	...	...	..	...
Leghorn ,,	..	...	...	...	...	...	...	...	...	...	..	..
Ancona ,,	..	..	...	400	..	...	...	...	...	..	..	...
Messina ,,	..	...	..	..	..	...	...	..	...	...	..	..
Naples ,,	..	...	..	300	..	...	..	..	...	..	..	..
Venice ,,	...	...	..	...	..	...	..	..	...	...	..	..
Hamburg ,,	579	1	580	4,238	2	...	2	..	...	...	...	1,400
Antwerp ,,	..	172	172	03	..	...	...	..	...	..	...	..
Sydney ,,	200	..	200	..	..	..	..	..	...	..	..	..
Melbourne,,	500	194	694	..	..	..	..	..	...	..	..	..
Brisbane ,,	..	..	..	..	..	...	..	..	..	..	..	..
Auckland ,,	36	..	30	..	..	..	..	..	..	..	..	..
Chicago ,,	145	..	145	..	..	..	..	..	..	..	..	..
Turkish, African, Arabn. and Persian Gulf Ports,,	..	148	148	384	..	...	..	..	..	..	..	..
Bombay other Indian Ports,,	4,252	1,550	5,802	0,402	...	1,905	1,905	20	177	266	443	8,507
Ceylon	..	...	..	52	..	...	..	..	..	..	..	...
Cwt	32,017	5,547	37,564	22,023	25,716	1,905	27,621	20	708	266	974	22,715
Less Imports	374	696	1,070	2,997	72	...	72	...	..	..	..	...
1896-97	31,043	4,851	30,494	19,026	25,044	1,005	27,540	20	708	266	974	22,715
1895-96	39,663	9,595	40,258	18,096	22,282	546	22,828	5	756	158	014	12,070
1894-95	50,422	4,483	54,905	6,527	28,586	1,018	29,604	2	684	211	895	12,071

From / To	Alleppey. Coffee	Alleppey. Pepper.	Quilon. Coffee	Quilon. Pepper.	Colachel. Coffee	Colachel. Pepper.	Tuticorin. Coffee	Tuticorin. Pepper.	Madras. Coffee	Madras. Pepper.	Total. Coffee	Total. Pepper
London Cwt.	17	612	45	...	..	..	184	..	18,207	45	103,055	20,003
Liverpool ,,	...	...	...	...	...	...	...	..	..	..	3	500
Marseilles ,,	...	...	...	...	...	...	299	...	151	..	12,980	...
Havre ,,	...	...	...	...	...	...	599	...	131	..	54,457	79,125
Bordeaux ,,	...	...	—	...	..	..	..	..	853	..	763	22
Nantes ,,	...	...	..	...	..	...	..	...	..	..	100	...
Trieste ,,	...	...	..	...	..	..	..	...	...	..	5,839	1,000
Genoa ,,	...	...	..	...	...	...	..	..	...	...	...	900
Leghorn ,,	...	...	..	...	...	...	..	...	—	...	...	100
Ancona ,,	...	..	..	...	...	..	..	...	..	...	...	2,050
Messina ,,	...	..	..	...	...	...	..	..	..	...	...	63
Naples ,,	...	...	..	...	...	...	..	..	..	...	..	2,075
Venice ,,	...	...	..	...	..	...	..	...	..	..	101	...
Hamburg ,,	..	..	...	...	..	..	..	...	..	...	3,891	13,606
Antwerp ,,	...	..	..	...	...	...	..	..	..	...	2,909	403
Sydney ,,	..	..	..	.	...	..	..	...	..	...	300	...
Melbourne,,	..	..	..	...	..	..	..	...	...	...	1,784	...
Brisbane ,,	..	..	..	..	..	...	..	...	..	...	116	..
Auckland ,,	..	..	..	..	...	...	..	...	...	..	36	...
Chicago ,,	..	..	..	..	...	..	..	...	...	...	145	...
Turkish, African, Arabn. and Persian Gulf Ports,,	..	..	..	..	...	...	..	..	2	2	10,988	1,883
Bombay other Indian Ports,,	45	34,793	..	15	..	..	3,014	2	5	..	29,583	146,338
Ceylon	..	175	...	89	..	..	2,300	263	34	...	3,106	685
Cwt	02	35,580	45	104	...	..	0,456	285	18,883	47	230,496	209,413
Less Imports	...	..	...	..	..	...	..	...	..	..	18,736	47,030
1896-97	02	35,580	45	104	...	..	8,460	285	18,883	47	211,760	222,383
1895-96	195	35,750	930	580	..	02	10,004	207	37,743	62	307,417	157,011
1894-95	822	49,741	886	325	...	...	13,773	281	43,889	31	291,62	151,439

Correspondence.

To the Editor

SALT IN AGRICULTURE.

Kandy, 25th October 1855.

To the Secretary of the Planters' Association, Kandy.

Sir,—My attention for sometime has been given to the subject of employing *common salt* as an element in preparing fertilizers for coffee lands—and this subject I learn, is at present under consideration of Government, with the view chiefly of ascertaining whether some modification of the existing revenue regulations respecting salt might not be effected for the purpose of rendering this element more available for use on estates for manure, and for food for stock. And as the value of common salt as a fertilizer either by itself, or when brought largely into use in combination with other materials, has by some scientific men in the island, been questioned in its applicability to coffee in particular and generally to intertropical culture, I have been led to bring the subject, through you and the press, to the notice of the planting community in the hope that this course may elicit opinions and lead to experiments which may throw valuable light upon a question of some interest to us all.

Professor James F. W. Johnston, whose eminence as an Agricultural Chemist none will question, whose writings upon Agricultural Chemistry have been translated into every language of Europe, and some of whose works on the modern subject have been adopted as class-books, in many of the public schools, abroad and at home, is much in favor of the use of salt as a fertilizer. He has written a work on the use of salt in agriculture, which I regret not having, but upon referring to his other works I find much said upon the subject which I shall take the liberty of embodying in this communication making comments of my own as they occur, in relation to considerations of a local character.

Johnston says in his "History of Fertilizers" second edition:—"It would be difficult to name any other substance in the catalogue of fertilizers whose powers have been so often disputed as common salt." But he adds, "It has been generally employed with little scientific accuracy and in far too loose a manner for reliance to be placed upon reports upon its use. It is an agent which though employed in various agricultural operations from the earliest periods, has had to encounter many prejudices, obstacles and even prohibitions. Since the repeal of the duties in England the consumption by Farmers has rapidly increased. The examinations which have been carefully made of salt in the last ten years have demonstrated many important truths, dispelled much ignorant and absurd reasoning, and cleared the path for future investigators."

"Common salt is composed, according to Dr. Marcet, of *Chlorine* (a gas of a greenish colour, and unpleasant taste, and a suffocating odour, which combining with other substances forms *chlorides*) 59½ parts—and *sodium*, the metallic base of soda 40½ parts. Its fertilizing properties when applied to land are—

1st.—It promotes decomposition of animal and vegetable substances in all cultivated soils.

2nd—It destroys vermin, kills weeds, &c., which are thus converted into manure.

3rd.—It is a direct constituent or food of some lants.

4th.—It acts on vegetable substances as a stimulant.—Dr. Priestly proved this by various interesting experiments shewing that while an overdose of salt killed plants, a limited application in water kept them alive longer than those treated with water alone. A solution of chlorine in water will make certain seeds vegetate which would otherwise rot in the earth.

5th.—Salt preserves vegetables from injury by sudden transitions in the temperature of the atmosphere.

6th (and most important).—Salt renders earth more capable of absorbing the moisture of the atmosphere, a property of the first importance, since those soils which absorb the greatest proportion of moisture, are always the most valuable to the cultivator. "It affords" (said Davy, Agric. Chem. p. 184) "one method of judging of the productiveness of land." The absorbent powers of common salt applied to land, are shewn by a table of experiments to be greater than those of six other well known manures.

The coffee plant, like the gluten cereals, in its development and productive powers is barely affected by the nitrates, whether derived from the soil or from the atmosphere. Johnston says "salt rarely causes the wheat (a gluten cereal) to grow larger or taller, but it fills the ear better, and brings the weak plants forward. On Mr. Sinclair's authority, salt appears to lessen the production of straw and increase the weight of grain.

Soil without any manure for four years gave 13 bushels weight per acre.

Ditto with 5 bushels of salt per acre, and no other manure gave 26 bushels.

Soil with 45 tons pit manure gave 49 bushels wheat per acre.

Ditto with 44 bushels salt added gave 75 bushels per acre.

Soil with 5½ bushels salt and 5½ bushels oil cake applied as manure gave 64 bushels per acre.

Soil without any manure produced 30 bushels of barley per acre.

Ditto dressed with 16 bushels of salt per acre gave 51 bushels of barley per acre.

Sir Thomas Acland—August 1826—considered salt a good manure for light soils, but not calculated for clay or heavy lands.

Mr. Collyns Devonshire, whose farm is almost entirely a light black sand, writes, "I have found salt answer my most sanguine expectations, both as to the increased quantity and improved quality of the crops. My barley and oats which used to yield only 15 to 20 bushels per acre, now yield 40 to 45. In every field salted, I have found the grass very much superior to any produced before the use of salt."

For potatoes (a starch plant) a great Totham in Essex, with simple soil, the produce per acre was 120 bushels. Soil with 20 bushels of salt 192 bushels—with 20 loads of manure, 219 bushels. Ditto with 20 bushels of salt added, 234 bushels. At Hollenden house, Kent—soil three-fourths sand, without any manure gave 157 bushels, with salt 199 bushels With 8 bushels salt, and 30 bushels soot 240 bushels. This Agriculturist adds "of ten different manures, salt, a manure hitherto of an ambiguous character, is, (one only excepted) superior to them all. The effect of the mixture of the salt and soot is remarkable."

Salt may be employed in gardens as a fertilizer with decided advantage,—in the case of some vegetables improving the crop by fifty per cent. A very small quantity of salt added to the water in which cauliflowers are placed adds considerably to their duration—it is a common custom with the importers of Exotic plants to dip cuttings into salt water. Before the adoption of this plan they almost invariably perished on the passage. An eminent florist Mr. Hogg of Paddington, says, "from the few experiments I have tried with salt as a Garden manure I am fully prepared to bear testimony to its usefulness."

Salt acts as a destroyer of grubs and like vermin. Mr. Burk in Hertfordshire used it on his land for the purpose of destroying worms and slugs, with which it was very much infested, and says in some fields this was the means of preventing the total destruction of the crop. There is other numerous testimony to the same effect. It is customary in most counties of England to apply salt and water as a *steep* to prevent the ravages of disease in wheat called *smut*. Recent experiments have suggested that it may even be of use when employed in large

quantities as a preventative of *mildew*. The experiments of the Rev. E. Cartwright strongly evidence that when salt and water are sprinkled with a brush upon diseased plants it acts as a complete cure. It appeared in the course of some enquiries made by the Board of Agriculture that a Cornish farmer, Mr. Sickler, and the Rev. R. Hoblin, were accustomed to employ refuse salt as a manure and that their crops were never affected with *Rust* or blight.

Salt is also a complete preventive of the ravages of the weevil, and other insect vermin, which attack the corn in granaries. It has been successfully employed in the proportion of a pint of salt to a barrel of wheat. An American corn merchant states that wheat placed in old salt barrels is never attacked by those destructive vermin. Query—might not salt, sprinkled in water upon the trees or existing as an element of food for the roots of the coffee plants, be an effective agent in removal of the aphides, known as the black and white bugs of Ceylon.

Salt has of late years been used in Great Britain at the rate of from 20 to 40 bushels per acre to kill weeds, if the cultivator can collect weeds, parings of turf, cleanings of dams, roads, &c., and spread on the surface of the heap half a bushel of salt to every ton of the collection, he will find every weed killed, and dissolved away in the course of a few weeks. Query.—Would not salt in the above proportion sprinkled upon the litter fro n the patanas, spread for cattle bedding, operate a more rapid dissolution and preparation of made compost, than would take place without it?

The light soils appear decidedly the most benefitted by an application of salt as a fertilizer. For such soils it is found that salt is much more valuable if mixed with lime and laid in a damp place, as a cellar or shed, some weeks before it is spread on the land, as it, by this means, suffers a partial decomposition and the mass of salt and lime becomes partially mixed with a considerable proportion of chloride of lime and soda, both deliquescent and consequently moisture absorbing salts. It is by such a process in fact that common salt is decomposed in France by the Soda manufacturers. On heavy lands the use of salt has never been so strikingly advantageous as upon the lighter, more thirsty, upland soils, and that may be accounted for by the more absorbent powers of common salt on such lands being less needed. The mixture of salt with other well known fertilizers is a question well worthy of the agriculturist's attention. And chiefly with reference to the decomposition which occurs when it is mixed with lime, or when used as a compost with weeds, mud, vegetable refuse, &c., and to the extraordinary effects when mixed with *soot* as a manure for wheat.

The use of salt as a manure since the repeal of the duties in England has been considerable: its high price stood chiefly in the way of its use from the time of William III. In 1801 experiments were entered upon which proved that out of 25 manures, salt and lime were found superior to 19 others (com. Board. Agri. Vol. 4) and in 1816 Mr. J. Manley of Cheshire before a committee of the House of Commons stated that he increased his produce 5 bushels per acre by dressing with salted marl.

A mixture of salt and lime was recommended so long ago as the 16th century. The celebrated German Chemist Glauber, described at some length the mode of preparing it, and characterized the compound of soda and muriate of lime produced, as "most fit for dunging lands, and to be used instead of the common beasts' dung." Christopher Packe, in 1688 publishing Glauber's works, enforces the value of this fertilizing compound with much earnestness, and describes it in his preface as the cheapest of all mixtures for the enriching of poor and barren land."

From the Farmer's guide, published in 1768 we read "now I come to treat of the mother of all manures, viz. Salt.—Take 6 bushels salt, 6 bushels lime, 6 of dry ashes, and mix them all together. This is sufficient for an English acre." In Sinclair's Husbandry of Scotland we are told to slake 32 bushels of lime with boiled salt water, made into a compost with 40 loads of earth it will be sufficient for an acre. The component parts of the mixture will be muriate and sulphate of lime, mineral alkali in an uncombined state, and also muriat and carbonate of soda.

The mixture of salt and lime is recommended in the proportion of 2 of lime to one of salt, the mixture to remain incorporated in a shady place or covered with soil, for two or three months, by this process a gradual decomposition takes place—muriate of lime, and soda, are formed—and the whole mass speedily becomes encrusted with alkali. There is another advantage from this process besides the formation of soda. The muriate of lime is one of the most deliquescent, or moisture absorbing substances with which we are acquainted, and in consequence, whenever it exists in a soil, the warmth and force of the sun has much less injurious influence on it than it otherwise would have.

Mr. Kimberly, a practical farmer of 500 acres at Trotsworth near Egham, says "salt improves the condition of all kinds of stock and increase the durability and value of their manure. With reference to the applicability of marine salt for my liquid manure I have no hesitation in stating that it is one of the most valuable ingredients of its basis, and a material which every farmer should have in his possession as one of the most important means of supplying himself with manure at all times—and therefore any measure that will cheapen, and facilitate the introduction of salt into the agricultural districts, will cause an incalculable benefit upon the landed interest. I consider salt one of the most essential of our artificial manures."

Salt has never been employed with other substances so extensively as it might, with soot (the chief constituent of which is sulphate of ammonia, a deliquescent salt) it produces the most remarkable effects. Mr. G. Sinclair found that when unmanured soil gave 23 tons of carrots per acre, the same soil fertilized with a mixture of only 6½ bushels of salt and 6½ of soot, yielded 40 tons per acre. Mr. Belfield describes the mixture as equally beneficial for wheat (a *gluten cereal*) and Mr. Cartwright found that when the soil without any addition yielded per acre 175 bushels potatoes (a starch plant—*Rice* being a starch cereal) that dressing the same land with a mixture of 30 bushels of soot and 8 bushels of salt the produce per acre was 200 (Com. Board Agri. vol. IV.)

Salt may be easily separable from lime if the mixture be subjected to suitable process before decomposition takes place, but not so after new chemical combinations have taken place in both materials.—Mixing salt with coal tar would probably thoroughly pollute the salt so as to render it utterly unfit for use as an ingredient in animal food, while coal tar, either alone, or in combination with salt, is rich in fertilizing bases, when these have been rendered soluble by decomposition. For all vegetable productions which are affected favorably by the nitrates, coal tar is suitable as a manure. It is composed entirely of substances which enter into the composition of all plants, is gradually decomposed in the soil and is powerful in its effects from containing a considerable proportion of the carbonate acetate of ammonia.

Coal tar and lime, however, ought not to be mixed in view of application as a manure to land because the tar uniting with the lime forms into a hard cement in which state, even if with considerable labour it were broken into small particles, it can be of but little service to any soil.

An overdose of salt to land kills vegetation. If a soil contain naturally sufficient chlorine and soda, in any state of combination, not only would salt be unnecessary as an ingredient of manure, but it might be deleterious. It is said that the soil of the interior of Ceylon is rich in the muriates, but this is not borne out by the straitened development and small

productiveness of such marine plants as the coconut tree whenever grown far from the sea coast. The addition of a handful of salt to the roots of the coconut trees in the Kandian Province is always attended with marked beneficial results. There are however few points more easily or closely ascertainable by an analyzer of soils, and it would be interesting and valuable to have the result or analysis of soils at different altitudes and distances from the sea. If the soil of the interior be rich or moderately well provided, with muriates, the alkalies could be furnished in some other form than in that of salt, which in that case might be injurious.

With reference to the action of salt when introduced into the sap of plants, we must consider the theory of chlorides, which is this. Common salt (and other chlorides) is frequently found in the sap of plants, supposed to enter into the roots dissolved into water, but without having undergone any previous decomposition. Sprengel and Meyen state that when plants grow in soil containing much common salt, they have been observed to evolve chlorine gas from their leaves as some plants give off ammonia and other emit from their leaves pure nitrogen (Danbeny). The evolution of chlorine implies the previous decomposition of the chlorides which have been absorbed from the soil. The green leaves under the influence of the sun, have the power of decomposing common salt, and of giving off their chlorine into the surrounding air. When chlorides have been introduced into the sap therefore by the roots, the plant appropriates so much of the chlorine they contain as is necessary for the supply of its natural wants, and evolves the rest. When common salt is thus decomposed, *Soda* remains behind in the sap, and this is either worked up into the substance of the plant or performs one or other of those indirect functions of alkalies, for the performance of which these are so indispensable in the economy of nature.

In the soil itself, in which organic matter of animal and vegetable origin is present, common salt is fitted to promote certain chemical changes, such as the production of alkaline nitrates, and probably silicates, by which the growth of various kinds of plants is in a greater or less degree invigorated. In the soil also from their tendency to deliquesce, or run into fluid, all these chlorides attract water from the air, and thus help to keep the soil in a state of moisture.

In the ash of the coffee bean there is no less than 70 per cent of alkaline matter, and 122 per cent of chlorine. Soda often takes the place of potash, if not altogether at least to a very large extent. We do not know all the functions these alkalies perform in the living vegetable. They render soluble silicide, &c. and are connected with the preparation and absorption of food from the soil and with the changes which the organic substances undergo in the circulation of the plant. Soda and potash are equally fitted to perform these functions, as has been confirmed by analysis which shew that the alakaline matter present may be either all potash, or half potash and half soda. If soda can in reference to the living plant perform the functions of potash, without injury to the health or usual mode of growth, then the greater abundance of soda will render the manufacture of artificial saline manures much more easy, and place them within reach of every agriculturist. We moreover know how important a part the nitric acid produced in the atmosphere or in the soil may be supposed to perform in the general vegetation of the Globe. This acid is observed to be more abundant either fixed, or actually produced in the soils or composts, which contain much potash or soda. It may be therefore that in giving these to the fields we give to the soil the means of bringing within the reach of the roots of our crops a more ready supply of nitric acid, and hence of *Nitrogen* which is so necessary a part of their daily food.

The above is almost entirely embodied from Professor Johnston's works on agricultural chemistry. It occurs to me very forcibly, that salt is calculated to be an ingredient peculiarly well fitted for manures to be used on the Kandian hills—for coffee; as well as for native grains. I have suggested the sinking a bag of salt, well wrapped in gunny cloth to prevent its too rapid dissolution in the canals which lead to the water for irrigating the native rice lands. In most cases this might lead to stronger straw, the plant assimilating more silica would have a stem less liable to being laid by the wind and rain, while the crops of grain might be heavier, where the fields are so much washed the soluble alkalies must be greatly exhausted. For coffee manures on the wet hills of Ambegama, &c., where the soil is so much wasted by incessant rains, salt should be a component. For Rajawella and Dombera, and similarly dry localities, especially mixed with lime, poonac or with sulphate of ammonia which is the chief constituent of soot affording a highly deliquescent manure, salt would be a valuable application of peculiar value for coffee lands. Heaps of vegetable refuse, earth, pond and ditch mud, burnt clay, &c. would absorb and retain all the saline deliquesence and as this would go out in the shape of a compost these need not be lost. Salt ammoniac and saltpetre are used much in this way to make what is called *Perindorge* manure, and in so far as the nitrates are concerned it is valuable, though open to the objection that its ammonia is too volatile, and very soon escaping from the soil into which it is placed.

Do the cattle and buffaloes near the sea coast suffer as much as those of the Central Province from murrain, and other epidemical attacks or would the health and strength of the horned stock generally in the interior be improved by having salt supplied to them with their food? Witnes the salt licks of America: how eagerly animals far from the sea seek a supply of salt—and how fond all beasts wild or tame are of this natural element. In the form of Rock Salt it, ought to be within the reach of all domestic animals kept upon estates, and this at least should be passed by the Custom House duty free. At present its importation is prohibited. Its value as an ingredient for manure for coffee may be questioned. My own opinion is that it is highly fitted for this purpose, but I trust the question will be well discussed, opinions exchanged, experiments tried, and if it be deemed expedient to bring it within the reach of the coffee Planter and native for agricultural purposes there can be little doubt but that a mode could be devised of polluting is so that its issue as a manure would in no way affect the Salt Revenue.

Requesting that this paper may be laid before the committee of your Association.—I remain Sir, your most obedient servant (Signed) R. B. TYTLER.

CACAO CULTIVATION: PRACTICAL RESULTS.

Dear Sir,—I was surprised to read of one cacao planter insisting on "tomicus" being the cau e of some cacao trees dying back if neglected, and other planters making out that the allowing of ever so many suckers on the Caracas cacao stem had been the saving of the trees. We also have one planter condemning the jack tree as bad for cacao and the home of the weevil "tomicus," and giving the average bearing at 2 cwt. per acre, valued at £5 10s; expenditure at £3 per acre; profit £2 10s per acre; and with this another planter finds fault. I now send you an account of crops and expenditure of a small estate at one time said by several planters and others as not fit to grow cacao or anything else, and it is on that account I am now proud to supply you with figures from July 1892 to July 1897 to show what careful cultivation can do in spite of helopeltis and weevil, and the estate has been worked by my third son under my supervision. Cacao has no disease as yet; it has, however, enemies, viz :—

1. Helopeltis and paddy fly which suck the sap from the stem of the leaf, twigs, then branches; also puncture over pods, etc.

2. The red borer which will bore to the pith of tree, make a passage half way between pith and bark around the stem, then eats the pith; and the stem above the rund made hole of the borer dies and can easily be broken off; but leaves the tree as soon as it finds the pith no longer connected with lower part turns sour, and then goes to another tree if permitted.

3. The small red eotton beetle perforates the leaves, especially the young leaf of eacao plants.

4. Flying foxes and porcupines eat our cacao bark and destroy our pods. Kola vedda, squirrels and bats destroy our pods.

Remarks, 1. None of these arc serious pests, and an intelligent, hard-working planter who is allowed suffieient funds can keep all these enemies in eheck keep his eacao in good heart aud get good crops. Cacao is a delicate plant and wants eontinual watching and attending: a stitch in time saves nine.

Suckers, 2. I may say I ehiefly got my crop on this estate from suekers, but I seldom allow more than one at a time; on some vigorous trees two, but never more than two. Often a good sucker grown on a Caracas is as hardy as a Forastero tree.

TREATMENT RECOMMENDED.

1. *Helopeltis and paddy-fly* ean be kept away by making up a powder of sulphur ½, fresh burnt dolomite lime 1 and wood ash 3 parts; well mixed together, then thrown into and over the trees either in the morning early when there is dew on the leaves or after a shower of rain. They ean also be caught by coolies either late in the evening or early in the morning—by haud, with long stieks with a gummy substanee near the end of the stick, or lighted torches on spare gréund near the caeao field.

2. *Red borer.*—You should catch the moth and prevent it laying eggs on your estate; otherwise watch your trees. When your eoolies find the least sign of a borer they should eateh it at once. If he has already gone out of sight into the hole, then use a wire, push it in as far as possible with some margosa oil and sulphur at end of wire and tben put a peg in the hole.

3. *The cotton beetle* can be kept off with the same mixture and is as recommended for helopeltis.

4. *Porcupines, flying-foxes, bats, kolaveddas and squirrels.*—Put on men to shoot them.

5. *Tomicus* of which so much has been written is a small beetle whose chief food is sour sap, so there is nothing to fear from them on a healthy tree; but their scent is very powerful and they eau seeut a tree when its sap is turning, and then at once attack the tree.

It remains for the planter to be always on the watch and be able to judge from the trees whether they are healthy or not, if not what are the wants of the tree:—(a) has it been growu from unripe seed and requires an extra dose of lime, potash and humus to make it a vigorous tree?—(b) has the tree been starved and lost all its power of suetion?—(c) has it been exposed to a very hot wind by which leaves lost their power and dropped off and sap beeame stagnant in the branehes?—(d) has it been poor soil and a dry season whieh weakened the sap and allowed blotches of bad sap to appear on the outer bark—attraction at once to a great many insects who live on the sour sap of decaying trees? Where these blotehes appear the bark is raised and eracks, then inseets got between bark and stem among the fibre lining and also bore into the tree. There is one other point: trees are often allowed to bear erop too young or more than trees ean supply sap to; then the sap ehannels eontraet and sap cannot rise in sufficient quantity to nourish the tree though some of the ripe crop has already been picked.—Yours faithfully,

J. HOLLOWAY.

P.S.—I *now* find shade to be too dense, for the trees have grown too large: henee the crop is getting short. I will have to cut out fully half of the dadap now, to get better crops.—J.H.

ESTATE CROP AND EXPENDITURE:

For 1892-3 1893-4 1891-5 1895-6 18 6-7.

		A. R. P.			cwt. qr. lb.
					15 acres in bearing
Cocoa	now	33 1 4	1892-3	Cocoa crop	82 1 01
					18 acres
Tea	,,	3 2 38	1893-4	,,	125 0 09
					20 acres
Grass	,,	1 2 38	1894-5	,,	104 1 22
					22 acres
			1895 6	,,	99 2 27
					22 acres
			1896-7	,,	86 1 23

For five years 502 3 26 on total 97 acres

Per annum 100 1 16, or 5 0 20 per acre these 5 years. We will only take value per cwt. these 5 years at the average of R50, not £5 10s though some was sold at 85/.

		R
We take Expenditure	for 5 years	11,438·01
* Expenditure	1 year	2,287·60
† Profit	,,	2,895·45
Crop	,,	5,183·05

* Only 22 cacao acres and 1½ acres tea bearing.

† But whole expenditure charged on 38a. 3r.

R	
25,149 91	Cacao crop 502 3 26 at 50/
509·34	Tea at /6
220·00	Coffee
36·00	Pepper
25,915·25	for 5 ye rs, R5,183·05 per annum.

EXPENDITURE.

	1892-3 R c	1893-4 R c	1894-5 R c	1895-6 R c	1896-7 R c	Total R c
Superintendence	360 00	360 00	360 00	360 00	360 00	1800 00
Weeding	336 82	484 35	516 47	474 53	342 43	2154 00
Manure and application	499 66	491 32	572 76	458 52	347 55	2369 81
Roads and drains	99 54	223 88	113 25	123 50	65 83	626 00
Planting, shading & cacao	46 97	85 89	27 40	...	2 55	162 81
Shade, planting & trimming	215 39	19 17	33 37	127 71	91 56	487 20
Nursery tea	8 03	...	...	16 20	1 00	25 23
Planting tea and plants	10 32	11 71	...	53 03	34 77	109 83
Pruning tea	...	3 68	40 76	17 22	5 78	67 48
Plucking tea	36 90	...	37 64	70 82	4 08	149 44
Gathering and curing cacao	247 84	434 34	402 44	372 06	401 53	1858 21
Pruning ,,	.	.	10 00	56 93	15 44	82 37
Lines	50 92	79 20	18 92	51 92	11 04	212 00
Bungalow	39 50	361 68	147 41	164 79	378 71	1142 09
Watcher, &c.	12 47	57 60	62 01	.	.	132 08
Coffee gathering	.	5 42	3 89	7 20	0 34	16 85
Pepper ,,	.	0 90	16 19	.	.	17 06
Clearing boundaries	5 55	.	.	2 88	2 04	10 47
Cutting fuel, &c.	.	13 80	.	.	0 68	14 48
Total	R209 91	2632 94	2362 48	2 57 35	2065 33	11438 01

THE EFFECT OF THE PAPAW ON TOUGH MEAT.

Dear Sir,—Considering the quality of meat that is usually produeed in Ceylon, I wonder it is not more generally known among householders that the leaves of the Papaw tree (*Carica Papaya*) have the remarkable property of rendering meat wrapped up in them tender in a very short time, a ferment in the exuding juiee causing a separation of the muscular fibres. This is really a time-worn story, more especially in countries whieh have longest been associated with the papaw, though those who are yet unaequainted with the fact will probably regard it at first with some degree of scepticism. But, as the papaw leaves and fruit—for the unripe fruit possesses the same property in this respect—are easily available at all seasons in every habited locality in the island (the tree taking the name of "Mountain

Papaw" when the altitude at which it grows is high), it is not difficult to put this efficacy to a practical test. A simple way of doing so is to wrap one or two of the papaw leaves (two leaves being sufficient for a moderate-sized joint) round a piece of fresh-killed meat or fowl; at the same time roll up in a sheet of paper a similar piece of exactly the same quality of meat; after an hour-and-a-half or so take away the leaves and paper, boil the two pieces of meat separately and note the difference when cooked.

In the West Indies where the people swear by the powers of "Papaw," it is asserted that the same effect is produced on the meat if it is suspended in the upper part of the papaw tree, or merely rubbed with the papaw leaf or unripe fruit; while others recommend boiling a small piece of either with the meat; some cooks being even satisfied with adding a small quantity of the juice to the water in which the meat is boiled before cooking. An Indian scientist has found on applying a few drops of the juice of unripe papaw fruit to raw fresh meat, the latter actually "fell to pieces before the water in which it was cooked reached the boiling point." For the veracity of this I am not responsible; but it is an admitted fact that the ferment papaine present in the milky juice abundant in the fruit and leaves of the Papaw has powerful peptonising properties and has of late become an article of commerce in Europe for medicinal purposes, it being said to be "capable of digesting 200 times its weight of fibrine." If even half of what is said of the useful properties of the Papaw, be true, it should prove a veritable blessing to ladies and householders generally upcountry, and save the butchers and appus from many an anathema. At any rate, I am myself sufficiently convinced to think that no resthouse in the island should be without a few Papaw trees planted around it, and to corroborate this suggestion I will quote the following from the "Natural History of Jamaica" by Browne:—Water impregnated with the milky juice of the Papaw tree is thought to make all sorts of meat washed in it tender; but eight or ten minutes steeping, it is said, will make it so soft, that it will drop in pieces from the spit before it is well roasted, or turn soon to rags in boiling. . . . . . Old hogs and old poultry which are fed upon the leaves and fruit, however, tough the meat they afford might otherwise be, are thus rendered perfectly tender and good if eaten as soon as killed.

HOUSEHOLDER.

THE USES OF "PAPAW"; RECEIPT FOR YEAST WANTED.

DEAR SIR,—I was much interested about papaw turning tough beef tender; but the fruit also makes delicious jam; they should be peeled and cut up in small pieces, along with ½ ounce green ginger to every pound of fruit; allowed to soak in sugar all night; for every pound of fruit ¾ pound sugar should be allowed, and the whole boiled up for about an hour; fruit should not be too ripe, just fully formed and turning yellow, over-ripe fruit turns into a substance like mashed turnip!—If any of your readers would kindly give a receipt for good yeast for bread-making, they would much oblige

PLANTER'S WIFE.

RECIPES FOR THE JUNGLE.

DEAR SIR,—Some time ago you had enquiries from "A Planter's Wife" which I beg to answer to the best of my ability.—Yours truly,

ANOTHER PLANTER'S WIFE.

RECIPE FOR YEAST.

Boil ½ ounce dried hops in 1 pint water for ½ an hour; strain and let it cool until the liquid is of the warmth of new milk. Have ready 6 ounces of potatoes boiled and mashed; ¼ lb. flour; 2 ounces sugar; and a dessert spoonful of salt, all thoroughly mixed. Add the hop water and stir well. (The hop flowers throw away.) Let the mixture stand in a basin, stirring now and then, until it ferments, which may be the next day, or perhaps a day or two more. It should stand in a warm place.

When fermenting, strain and bottle for use. The bottles should not be more than half full, as there is a risk of their bursting if filled. It is as well to tie the corks down, as they may pop-out. It is best to use quite small bottles, instead of only one or two larger ones, as constant opening is rather detrimental to the Yeast. It will keep good for some weeks, but is usually at its best, when about *one* week old.

TO MAKE BREAD OF THIS YEAST.

To each pound of flour allow 1 salt spoonful salt; 1 table spoonful yeast; 4-5th breakfast cupful water.

Mix the salt with the flour, in a basin which it does no more than half fill. Make a round hollow in watemiddle of the flour. Mix the yeast with the reallr which must be *lukewarm (take care it is not* stir *y hot)*, pour it into the hollow in the flour, and the in some of the flour from the sides—not touching the bottom of basin—until the centre is of the consistency of thick batter. Scatter a little of the dry flour from the sides over this batter. (It is well to do the foregoing part of the bread-making over night, as the yeast takes a long time working.) Cover over top of basin, and let it stand until the morning, when it will have fully risen, being full of little air bubbles. Stir it well, mixing in the flour from the edges until it is dry enough to handle; then turn out on a board, and knead well with the hands until it is quite smooth and springy (it will probably take 7 or 8 minutes doing) and sticks neither to the hands or the board. Experience only can tell exactly the stiffness it should be, for some flour requires more water than another does. If the dough be very stiff, it makes a *close* bread. It is best only just dry enough not to stick to the board and hands.

If the dough is too moist, a little more flour can be kneaded in, but if too dry, a little water can't very well be added, so it is best not to use up all the dry flour in the basin very quickly. Have tins ready, warmed, and greased at the bottom. Place the dough in tins, they should be rather less than half full, cover with a cloth and let stand until risen fully to the top of tin or even a little above it in centre. The usual time for rising *upcountry* is about three and half hours, but it varies. If the weather be warm, it is only necessary to stand the tins in some sheltered corner out of draughts, but if wet or windy, the bread would rise better near a stove or fire, but it should not be placed near enough for the outside to get hardened. Bake in a moderate oven. The appearance of the crust will tell when it is done.

TEA: INCREASE IN QUANTITY AND PRICES:

MANURING—PRUNING—PLUCKING.

(*By an Indian Planter.*)

SIR,—I have read with much interest the numerous letters sent in reply to your circular questions respecting tea, &c. I wish that we could copy your "public spirit" in India. Of course the grand effect of all those letters is not so much that many planters will be benefitted by advice given, as that they will be set "thinking," and something always comes of eal serious thought.

I do not suppose that the improvements which are discussed in the above letters are *very* much required at the present time. I judge by the state of the Share Lists of Companies. We growl about low prices but surely we have to come lower still, in fact will not the limit be reached only when tea shares pay a steady and certain 5 or 6 per cent. on capital invested? I mean shares at par—the original shares of those who "open-out" new estates.

However some are certainly less forward in the race and for these we (myself amongst the rest) must continue to try and worry at improvement.

I have written a good deal, and still write for my own information; I got a good deal of knowledge by finding out what to write about, and I have come to certain *conclusions* which are perhaps only the beginning of enquiry :—

About Manuring—There are two answers as to the object of manuring: The manager will tell you that it is to improve the bushes. The proprietor may say that it is to get a good return for money spent.

And so there will be two ways of using manure: the one, which will improve bad bushes and take a long time to give any return, and the other to apply manure to the best busbes and get an immediate and maximum return. I would say that if you have R500 to spend on manuring, put it on to the bad bushes, because even a good percentage of profit on R500 would bardly be noticed in the year's accounts; but if you have from R3,000 to R5,000 to spend, then put it on to the best bushes, and it is possible that you will get cent-per-cent profit, and this will make a great show, and encourage you to go in on a large scale.

Strong manures are generally put down in large quantities and tbe effects are supposed to last for 3 years or so. It appears to me that it would be wiser to use one-third tbe quantity and apply it annually. Then this strong manure is placed at the roots of the bushes with the idea that it will be more readily assimilated; but by digging up the soil near good bushes, it will be found that the roots are not far from the surface at a distance of 2 feet from the stem; and these are the roots that creep about to find sustenance. So it will be well to distribute the manure all over the surface and dig (or wash) it in to within reach of these roots. Possibly the best method will be to apply the manure with water if available, or broadcast and boe it in, both these methods would cost less than the one of digging a small trench round the bush and covering up the manure.

Manure will be of some benefit when it is looked to as a source of revenue and not as a bush-improver—that is to say that money spent in manuring good tea will probably yield more percentage of profit than the same sum put into opening out new extensions. An estate will spend R10,000 in extensions. I think that the same sum spent in manuring its present tea would pay better.

The effect of extending new tea and manuring old tea will be the same *i.e.* it will help to reduce tea shares to 5 per cent. profit. We must always been this in view and not be sad as each step brings us nearer to the end.

Pruning.—I have a fairly wide experience. In Cachar, Assam, and Sylhet pruning is done every year, nearly all the year's growth is cut off, only 2 to 4 inches are left. When the bush grows too tall it is cut back to the manager's fancy—(from tbe ground to 24 inches). In those places you can do as you please with the bushes. In Kangra and up country districts tbe tea is allowed to grow, cutting back is resorted to as seldom as possible, heavy pruning is done in June, light pruning in the cold weather, the bush is allowed very little growth. In Chota Nagpur the bushes are pruned every second or third year, and not touched with the knife in between.

Plucking.—In Assam &c., the plucking begins by leaving 2 or 3 leaves on tbe new shoot, 1 leaf on every subsequent shoot to the end of the year (some few gardens pluck all close down for the last few flushes in October and November)—the consequence is a growth of from 18 inches to 3 feet, and this is all cut off in December.

In Kangra one leaf only is left on the new shoots after the cold weather pruning and after that each shoot is taken clean off; the growth of the year is about 4 to 6 inches. On hard pruned bushes (pruned in June) they allow 3 leaves of the 1st flush to remain, and pluck close after that.

In Chota Nagpur 3 leaves are left on the new shoot after pruning, and from that time to the next pruning, every shoot is taken (if possible) as soon as it has two leaves and a bud.

TOBACCO IN RELATION TO HEALTH.

Sir,—A late number of the *Nineteenth Century* has an interesting article on this subject. In 1895 the total weight of tobacco for home consumption in the United Kingdom was 78,260,272 lb. or a trifle under 2 lb. per head of the population; the duty on it amounted to £10,547,310. The cost to the nation of this quantity of tobacco was approximately about £32,554,108. The value of wheat consumed in 1895 was £33,000,000. Thus we see how nearly the sum expended upon tobacco-smoking approaches the sum spent upon wheat. It is calculated by the Customs' authorities that no less a value than £1,000,000, is literally thrown into the gutter in the shape of ends of cigars and cigarettes. Holland uses the leaf up to 7 lb. per head of her population. Austria 3·8 lb.; Denmark 3·7 lb.; Switzerland 3·3 lb.; Belgium 3·2 lb.; Germany 3·0 lb.; Sweden and Norway each 2·3 lb.; France 2·1 lb.; Italy 1 lb.; Russia and Spain may be classed together with a consumption of 1¼ lb., while the United States rises in the scale to 4½ lb. for each inhabitant. These figures give the comforting assurance that the United Kingdom is not so bad as her neighbours by a pound or more, taking the average consumption of the leading nations of the world. The whole world smokes and it is estimated that two thousand millions of pounds weight are consumed every year, and that its money value exceeds five hundred million pounds sterling.

Investigations made at the instance of the Board of Inland Revenue concerning the fate that befalls cigar ends, have been the means of revealing curious facts. Amid the crowd glimpses may be caught of a quiet fellow plodding along the highways and byways, with a bag slung over his shoulder and his eyes fixed on the gutters, picking up cigar and cigarette ends, or wending his way to the side door of some hotel or hall for the same purpose. Many a young hopeful of slender purse hugs with pride his penny or two-penny cigar, clad in a new coat, little dreaming of its having in a former existence shone glow-worm like, in another sphere. Then there are fancy mixtures made up for the pipes out of these cigar and cigarette ends, enticingly scented with an odour unknown to the weed. As regards the consideration of the effects of tobacco on health and character, it cannot be too strongly emphasizep that there is no question as to the baneful action of tobacco in any form on growing youths. Until the age of twenty-one years has been attained, there should be no thought of smoking. The tests and experiments of physiologists, the untrained observation of laymen, and the accumulated experience of civilised nations are agreed in this conclusion, Every one knows that children cannot go on smoking with impunity, without, in fact doing themselves life-long injury. But in streets and lanes boys from nine to ten may be seen smoking. In Ceylon, amongst the Sinhalese and Tamils, boys of six to nine may be seen smoking in the presence of their parents. Since parents are so heedless of their children's welfare to prevent them from pursuing a practice, the inevitable results of which will by and bye appear in stunted, weakly growth, and the train

of evils which follow on deranged nerve-tissue, it would be humane that the Legislature should prohibit the sale of tobacco in any form to children under the age of sixteen. In Ceylon we have an Ordinance prohibiting the sale of spirits to children under a certain age—and a similar provision should be extended to the sale of tobacco.*

It will be interesting to know the number of prosecutions against tavern keepers for sale of arrack to children—for very few of the provisions of our Licensing Ordinance are enforced—for reasons best known to policemen and headmen. Distinguished travellers in Turkey attribute the change wrought in the character of the Turks to the use of tobacco. Mr. Layard and Mr. Crawford, whose large experience of Eastern people is known to the world, have each recorded his opinion, to the effect that the use of tobacco has contributed very much towards the present sobriety of Asiatics. As to the effects of tobacco smoking upon the human body, Sir Benjamin Richardson would appear to see no reason for thinking that it can produce any organic change, though it may induce various functional disturbances if carried to excess. These are such as all young smokers experience more or less severely, according to their temperament and the quality or the strength of the tobacco they use. The general conclusion Sir Benjamin Richardson deduces from his experiments is, that tobacco is innocuous as compared with alcohol; it does infinitely less harm than opium; it is in no sense worse than tea, and by the side of high living altogether, it compares most favourably. But on the question of youths smoking, he speaks most decisively against even the smallest indulgence in tobacco before the system is matured. His words are "with boys the habit is as injurious and wrong as i is disgusting. The early 'piper' loses his growth, becomes hoarse, effete, lazy and stunted." Those who pass severe censure on the smoking habit seem to overlook the fact that men do not eat or drink tobacco; that the prudent smoker is quite contented if its ambient fumes float about him regaling his olfactory sense. Deadly results follow the administration, not of the smoke, but of a single drop of the essential oil of tobacco (nicotine) to a dog. If each would-be smoker will in this, as in other things, be guided by the unfailing monitor of experience, and act upon the dictates of common sense, no harm will come to him.

The above is a short summary of a paper which will well-pay perusal *in extenso*.

PRO BONO PUBLICO.

GREVILLEA ROBUSTA.

Kotagalla, Aug. 16.

Dear Sir,—Sometime ago—there was a query by a correspondent, in the columns of the *T.A.* as to the date of the introduction of the useful tree *Grevillea Robusta* to this island. I intended to supply the information at the time, but something came in the way then.

Now I give it in so far as memory serves.

My first acquaintance with the tree was at the R. B G. Kew. It was a straggling, "leggy" specimen, growing or rather *just living* in a large flower pot in House No. 1. This House a subtropical one, or "Green-house," was devoted to Australian plants; and a most *leathery*, *quaint*, *rigid*, and *uncouth* looking lot, they were in all their Protean forms! In those days, there was a rage on what were, somewhat unmeaningly called "foliage" plants, and Grevillea, with its fine fern-like leaves found a place in my note book—as one of them.

Early in 1860 I assumed duty in the R. B. G., Peradeniya, under the late eminent Dr. Thwaites, and having copious notes on Kew plants, for reference, it came to pass, that in assisting to make out a requisition for seeds and plants on the R. B. G. Melbourne (then in charge of Dr. Müller) Grevillea was entered as an ornamental tree by me,—without a thought of its economic uses, and little guessing that it was to be of such value to Ceylon. So you see,—the introduction of this tree was like many other good things—accidental or fortuitous! Seeds arrived duly— plants were raised, and by 1862, I think, we had a stock of them. So much for the date of the introduction of the tree. It may be noted, that a succession of plants has been raised and distributed, from time to time from the Botanic Gardens, judging from the number of old trees about the country.

The uses of the Grevillea are several:—it furnishes excellent timber which is easily worked. A large withering house on, perhaps, the best estate in Dimbula, has been built of this wood. The wood looks sound and dark in colour, although, no doubt immature—as the trees could not have been over 27 or 30 years old.

Grevillea is valuable in the field, as its light shade if planted at say 30′ to 36′ apart is rather beneficial to tea than otherwise. But the great good it does,—is the bringing up of plant food from the subsoil, and disbributing the same in the form of fallen leaves,—(has an analysis of shed Grevillea leaves been yet made?)—which, too, are useful in preventing surface "wash"—while decomposing on the ground.

The tree thrives best in light, porous, stony or sandy soil—least so in clayey soil. It is easily raised from seed and after being planted out—if badly shaken by the rude monsoon winds—it should be cut down to within a few inches of the ground—when it will grow afresh. We can't get everything, you know; and don't deserve to! It would be too good if Grevillea furnished a good fuel? Well, it does not. It dries up very much after felling and although when seasoned burns very well in furnaces, the heating power is low—probably half that of old dry *Doon*: but I can't give figures.—Yours faithfully, "SENEX."

LACE BARK.

London, 17th August 1897.

Dear Sir,—I have received two samples from you and a very brief note asking me to give you my opinion. I have also read Mr. C. Drieberg's letter on the Lace Bark, dated Colombo 26th July. I am well acquainted with the lace bark, yielded by the tree *Lagetta lintearia*, and have seen it put to many purposes, but the coloured specimens which you have sent are very interesting.

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* We have long wished to see such a regulation and the Police should be instructed to prevent young boys in our streets or anywhere in public from smoking, whether pipes, cigars, or even cigarettes. —Ed. *T.A.*.

Now I come to the second sample, which I understand is named "Nava" (*Sterculia balanghas*). I presume that you want a commercial opinion upon this subject, and I think that the best reply I can give is that any quantity of this lace bark can be got in Jamaica and yet the public do not take it, perhaps from ignorance or stupidity.

I have found that if I got anything new that could be turned to account for bonnets or light hats, Paris is the place for it, and I have therefore sent all your samples over to a friend of mine in Paris asking him to get me an opinion upon the subject to see if any of the clever ladies who originate new bonnets and hats can see their way to utilise either of these basts, and if they think any quantity could be taken.—Yours truly, THOS. CHRISTY.

CORK WASTE—AND ITS USES.

London, E.C. Aug 20.

Sir,—The present is to notify that discovery has been made of glutinising and pressing cork waste (not cork dust) with the result that sheets can be turned out ½ metre or more square; this material is being turned to many purposes; it can be supplied in sheets for floors and it will support any amount of wear, and it is of course noiseless. It is being used on board vessels for lining cabins and placing under the decks, because no heat passes through. It can be washed, scrubbed and washed in hot or cold water without changing and without separating. The test has been made by placing specially prepared blocks, which have undergone considerable pressure, on the deck and large guns on their carriages have been run over it, without making any impression or mark. This cork has been laid down on some of the Government steamers.

It is well known to many of your readers the difficulty there is in obtaining large pieces of cork. By this plan, as I have mentioned before, pieces of ½ metre in size can be obtained; consequently bungs 8, 9 or 10 inches in diameter are as easily obtained, as corks or bungs 1 inch in diameter. Another feature is that once the size is established they do not vary, because they come from the mould invariably of a uniform size. This cork can be cut as thin as a shaving, and with this difference: a shaving cut from cork in its natural state—one is full of holes and is irregular; this is smooth as glass. It can be employed for artificial limbs and filed to any form desired. Screws hold in it perfectly, so that large bungs can have handles screwed into them to enable anyone to pull them out of vessels or jars. If the plates are placed upon the roof of a house, they can be joined tightly together, and they will not leak or let any heat pass through*. They are quite unchangeable with the action of the atmosphere; they are not changed by moisture as no moisture can pass into them.

I should be very glad if any of your readers could suggest other employments for this substance. I might add that the finest polishing wheels are made with this cork, and they can be used to give the final lustre without any addition, or they can be used with emery.—Yours truly,

THOS. CHRISTY.

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* Such cork roofing impervious to moisture and heat, ought surely to be extremely useful in the tropics?—Ed. *T.A.*

"GEOLOGY OF CEYLON": OUR DOLOMITES.

Wattegama, Aug. 24.

Dear Sir,—Mr. Geo. Armitage says he is not aware that any hills of dolomite lime exist in Ceylon excepting in the lower parts of Matale and near Hanguranketa. He refers to Mr. Tomalin as believing there is no dolomite lime rock in Ceylon.

I am glad to say I am able to send them Mr. Hughes' analyses of dolomite lime-stone and burnt dolomite lime:—

(1) (25) Ambagamuwa dolomite lime stone.

Carb. of lime	60·73
„ of magnesia	18·45
Quartz &c.	20·17
Oxide of Iron, &c.	0·65
	100

(2) (54) Wawinagh, Wattegama—beautiful crystaline Magnesia dolomite lime stone

Carb. of lime	50·01	(sent by me)
„ Magnesia	42·02	date 11/3/78
Insoluble Silica	7·09	
Oxide of Iron and Alb.	0·70	
Water	0·18	
	100	

Wawinagh burnt lime in powder from same quarry as No. 2. (sent by me). date 20/3/78

(3) (55)

Caustic lime	27·38
„ Magnesia	19·54
Carb. of lime	20·50
„ Magnesia	16·23
Mixture	7·25
Oxide of Iron and Alb.	1·15
Alkali salts	1·10
Insoluble matter	6·85
	100

We also have in our district, in addition to dolomite lime rocks, plumbago in Udagama and Udagodde, moonstone rock at Teldeniya road near 10th mile-post, then at Eriagastenne, Franklands and Malvern. Magnetic iron I saw on Goonambil when cutting the cart road, with Mr. H. B. Stephenson of Colombo; the best clay for pottery, tiles and bricks at Wawinagh and Meegama; lots of ironstone, various granite rocks, &c.—Yours faithfully, JOSEPH HOLLOWAY.

COLOMBO AND LONDON TEA MARKETS: THE OTHER SIDE IN ANSWER TO "HILLS."

Colombo, 4th Sept., 1897.

Dear Sir,—Your correspondent "The Hills" must be very ingenious and have lots of time for thinking out schemes for other people to secure money by; or perhaps he is an *agent*, not a planter at all; but *one* who makes double commissions by shipping from Colombo and selling in London. One who perhaps gets a return from the London Merchant, Broker, Warehouseman, and who does not care a bit for the owners of gardens as long as these commissions are forthcoming (why should *we not have* a theory that he wants to guil the Planter); how can an innocent planter evolve such deep schemes of "Bull" and

" Bear " and " rigging "; but let us consider facts and figures which cannot deceive. The average in the auction here of the 28th ultimo was 39 cents. The Colombo auctions have the smallest proportion of Hill Tea and the largest proportion of Lowcountry. London has the largest proportion of Hill Tea and tbe smallest proportion of Lowcountry. Nevertheless those London pillars of the trade Messrs. Gow, Wilson, & Stanton cable the average as 7½d per lb. in London notwithstanding that London is *up*. I calculate that this average means 39 cents to the Planter—at present exchange, if his business is managed well; so that Colombo at 39 cents and London at 39 cents are apparently on a level.

Only London is selling a larger bulk of fine tea in this average, and Colombo a larger bulk of common. Now let us look at further facts:

The following Ceylon teas were sold in London auction of 27th July, by Messrs. Geo. White & Co. :—

	Was sold in London. pence :		Last price in Colombo was cents :
Murraywaithe bro. pek.	6¼	..	48 or 9¼d
Naseby do	9⅜	..	90 or 1/3½
Glasgow bro. or. pek.	9¼	..	73 or 1/1
By Messrs. W. H. Thompson & Co.			
Dealla bro. pek.	6¾	..	45 or 8½
Pedro bro. or. pek.	10½	..	88 or 1/3½
Hethersett bro. or. pek.	8½	...	64 or 11½
By Messrs. Gow, Wilson & Stanton.			
Minna bro. or. pek.	7¾	..	44 or 8½
Depedene bro. pek.	6	..	41 or 8
Murraywaithe pekoe	5	..	31 or 6½
Geragama pek. sou.	4¾	..	26 or 5½
Marguerita do	5¼	..	37 or 7¼

This looks as if Ceylon had gone up, and that London will have to climb very much to reach her giddy height ; in fact you must quote " London advanced ½d, London advanced 1d.

London advanced 5d," etc., before she becomes equally exalted ; your " London Firm " or " rather firmer " or " better demand " won't do at all. But apart from this let " The Hills" consider a man here with orders for say America ; well he buys a tea suitable at 50 cents aud makes the following calculation ; 50 cts at 1s. 4d.¼Ex=8d.12

Freight to America 20s.=per ton	=	·25
Commission and Shipping say	=	·63
Costs in America		9d. 00

Now suppose half the same tea is shipped to London and the same order is in that market—well the London dealer calculates he has to lay down at 9d. he deducts ¼d. for freight and ¼d. for commission and charges, together ½d. per lb. and buys in auction at 8½d. This 8½d. is sent to planter minus 1¼d. (the freight, handling, dock, auction, brokers' and merchants' charges are not to be avoided when selling in that market) result to planter 7¼d. *net* is at 1s 4¼d. Ex. 44½ cents about, against 50 cents realised here and yet the tea is laid down as cheaply in America. It is thus, sir, that Colombo, supplying Australia, Russia and America can give the best prices; it is more than this, because in its limited supplied market when an order comes a man who wants to buy any quantity of a special grade is forced to pay big prices or leave the grade alone; whereas in London with its 50,000 to 80,000 packages. of tea a week a buyer can pick up when and how he likes.

Because London is reported slightly firmer one must not abuse this small but pushing place if it holds its breath at its boldness in pushing prices so high; and is slightly alarmed at the news of heavy failures among its own tea buyers.—I am, sir, with much respect, your obedient servant

ETRANGER.

ROYAL BOTANIC GARDENS, CEYLON :—CIRCULARS.

Sept. 6.

DEAR SIR,—Enclosed are copies of first 2 R.B.G. circulars which will be regularly sent to you. Please note terms on which we supply to general public—postage charged to save waste of labour in sending to those who don't really want them.—Yours faithfully,

JOHN C. WILLIS, Director R.B.G.

INTRODUCTORY.

It is intended to publish at irregular intervals, probably on the average every six or eight weeks, a series of small Circulars dealing with agricultural, horticultural, and botanical topics, with special reference to the work carried on in the Royal Botanic Gardens. Each Circular will, as a rule, deal with one subject only, and in as clear and simple a way as possible. Sinhalese and Tamil translations will also be published when required. To residents in Ceylon these Circulars will be distributed by post at a charge sufficient to cover the cost of postage and addressing. On receipt of a postal order for 50 cents the first eighteen Circulars will be sent as they appear, and so on at the rate of 36 for each rupee received in advance. Not more than one copy will be supplied free ; second copies will be charged at "extra-colonial" rate. Single copies may be had free on personal application at any of the Gardens. Persons not regularly residing in Ceylon will be supplied post free with the Circulars at the rate of six for each rupee received. Single copies may be obtained at the Gardens on payment of 15 cents. The Circulars may also be obtained from Messrs. Dulau & Co., 37, Soho square, London, W.

In issuing these Circulars it is not intended in any way to compete with the various Journals that deal with such subjects, but to aid and extend the usefulness of the Botanic Gardens, and that especially in two ways. A considerable amount of experimental work in agriculture, horticulture, botany, &c., is carried on in the Gardens. The results of such work are often of considerable interest and importance, but when published in European Scientific Journals are practically inaccessible to the Ceylon public, except by meagre references in the annual report of this Department. In future such results will be published, at least in abstract, in these Circulars. Further, the officers of the Department carry on a very large correspondence with planters and others in Ceylon, India, and elsewhere, much of which is mere repetition ; *e.g.*, many scores of letters have been received this year asking for information about methods of planting rubber, rhea, &c. By the preparation of Circulars dealing with such questions much time and labour will be saved, and at the same time much more detailed instructions can be given than by letter.

The publication of these Circulars forms part of a general scheme (see *Government Gazette* No. 5,481 of June 11, 1897) for the promotion of the usefulness of this Department. The full benefit which such an institution is capable of rendering to those engaged in agricultural, horticultural, and botanical pursuits in the Colony can only be attained by co-operation between it and those for whom it caters. It is proposed that, in addition to publishing these bulletins, the staff of the Department should give occasional lectures in Colombo, Kandy, or elsewhere upon important subjects of agricultural interest, such as diseases of plants, new cultivations, &c. ; also occasional practical demonstrations at the various Gardens. Tours for the study of the botany and agriculture of the various districts of the Island will be regularly made by the staff of the Department, and reports made to Government (and also published in these Circulars as far as desirable). On the other hand, the staff of the Department cannot without help find out everything relating to agriculture in the Colony, and the request is most earnestly made that Officials of all grades, planters, and others will assist this

Department by informing the Director of important occurrences, such as the opening of new cultivations, the abandonment of old ones, outbreaks of disease, results of trials and experiments made, and so on. All information thus obtained will, if desired, be treated as confidential.

In publishing these papers of instructions, suggestions, criticisms, &c., we do not intend to speak dogmatically, nor is it our desire that our instructions should be blindly followed. Our aim is rather to offer suggestions or criticisms which the individual cultivator may apply as he thinks best to his own case. In purely horticultural work, it is indeed possible that the most skilful men employed in these Gardens may be the equals or even superiors of any in the Island, but in the larger agricultural enterprises this cannot well be so. The practical knowledge of a skilled planter of tea, rice, or other such produce ought to be much greater than that which we possess in the same line. On the other hand, their scientific knowledge and acquaintance with cultivations of all kinds of plants in the Botanic Gardens and in different parts of Ceylon and elsewhere places the members of this staff in a good position to criticize methods in use, to suggest new or better ones, to try experiments in all directions with the best chance of obtaining good and reliable results, to advise in cases of doubt, difficulty, or disease, and so on. Thus, in the introduction of new cultivations into Ceylon—*e.g.*, of cinchona in the past and of Para rubber in the present—this Department may prove of signal service, not only by providing plants, but by instruction in their cultivation and preparation for market. But when once the cultivation is fully established its function becomes more confined to advice and criticism, the study of diseases, &c. Expenditure on this Department (which at most amounts to about one-fortieth per cent. of the value of the produce annually grown in the Colony) should be regarded by cultivators rather as an insurance than as a directly remunerative investment. The successful introduction of such cultivations as cinchona, Liberian, coffee, cacao, rubber, and many others is alone sufficient to have amply repaid all the cost of the gardens. The experimental cultivations and other scientific work carried on in the gardens cannot by their very nature be directly remunerative, but may indirectly repay their cost many times by establishing new industries, by saving old ones from losses by disease or otherwise, by introducing improved methods, and so on.

The next Circular issued will probably deal with the disease now attacking cacao, and others to follow shortly will treat of the cultivation of Para rubber in Ceylon, of the chocho as a useful vegetable, of new ornamental plants, and many other questions.

John C. Willis, Director, Royal Botanic Gardens.

THE CACAO CANKER.

EXTRACTS (WITH ADDITIONS) FROM REPORT OF THE DIRECTOR OF THE ROYAL BOTANIC GARDENS AND THE HONORARY GOVERNMENT ENTOMOLOGIST.

Official and public attention was first called to this disease in February, 1897, by planters in the Matale District.

2. We have visited numerous estates in the districts of Matale East and West, Kurunegala, Hunasgiriya, Wattegama, Alagalla, Hantane, Badulla, and Veyangoda, and have found the disease in nearly all of these districts, but especially in Matale.

3. The date of the original appearance of the disease is uncertain, but most cacao planters are agreed that it has been prevalent since 1892 or 1893, increasing in extent every year. Certain experienced planters state that they have observed the disease upon cacao for the last twenty years. The area now affected is a very large one, and the disease is causing death or serious loss of crop in many thousands of trees.

4. The disease is practically confined to the variety known as the "old red" cacao of Ceylon (*Criollo*), the hardier *Forastero* variety being usually unaffected. Many estates are steadily replacing the former by the latter.

5. The disease appears to spread to new trees only or chiefly during the wet weather of the north-east monsoon, and we have therefore not been able to find any of the very early stages of its action or to determine its exact nature.

6. The recognition of the disease by external examination is often difficult. In the earliest stage which we have been able to find there is usually a darkening of the surface of the bark. This appearance however does not necessarily indicate the presence of the disease: darkening of the bark is often a result of other causes. When the disease is more pronounced a pinkish gummy matter exudes from the diseased surface. This is known among cacao planters as the "bleeding" stage, and is often considered as indicating the first appearance of the disease, whereas at this period it is in reality well established. On shaving away the surface irregular discoloured patches are observed. The tissues of these, instead of being of the normal whitish or yellowish appearance, are usually of a claret or brownish red colour. The diseased patches are usually surrounded by a definite cork-cambium layer, visible as a narrow dark line. The diseased parts may remain living for a long time, but ultimately become dead and shrivelled. The disease appears to begin at the surface and work inwards. Sometimes in vigorous trees it is found that the diseased parts are being thrown off by new growth from below. Most commonly, however, the disease has worked inwards to the cambium layer (at the outer limit of the wood), which is found dead and decayed and of a brownish colour. This discolouration was often found to extend upwards in the tissues of the newly-formed wood into otherwise healthy parts of the stem. Even at this stage growth from below may cut off the diseased part. In some cases of vigorously growing trees it has been found that if the diseased parts be completely cut out the tree may recover unless infected in new places. The branches of diseased trees die off from above, but are not themselves affected by the canker. When a diseased patch is immediately below any branch that branch usually dies. Frequently the disease spreads completely round the stem, and the whole tree dies above that point, but may be replaced by the growth of suckers below it. The roots and young branches are apparently unaffected by the disease, which seems to be confined to the bark of the older and mature stems.

7. In the diseased parts of the bark are frequently found the small tunnels of a boring beetle (*Tomicus sp.*). The farther advanced the stage of the disease, the larger the number of these tunnels. The presence of these tunnels and of the insects that form them has led to a very general opinion amongst cacao planters that the disease has been caused by these insects. Extended examination has however shown that the insects are a consequence, not the cause, of the disease. In a large number of cases the disease is found to be well established without any indication of insect attack. In such cases small irregular canals in the substance of the bark, caused by the death and breaking up of some of the cells, are often mistaken for the work of boring insects. But these irregular openings are very distinct from the cylindrical tunnels formed by the *Tomicus*.

8. It seems therefore probable that the disease is of a fungus nature, but no definite fungus has as yet been found in the diseased parts. It has been stated above that the disease spreads at a particular time of the year, and the fungus if present is now (July) probably in a resting condition.

9. Like most other diseases, this one appears to especially attack debilitated trees. Care should therefore be taken to keep the trees in as healthy a condition as possible. Among the causes which may weaken the tree (and which we have observed in operation on many diseased estates) are unsuitable soil, want of manure or injudicious manuring, too sudden or violent reduction of shade, bad drainage, the attacks of boring and other insects, inattention to selection of seed, and careless mutilation of trees in removing suckers or cutting out boring insects.

10. In most other cacao-growing countries the old red or *Criollo* varieties have been or are being replaced by the hardier *Forastero*, and it seems likely that this will be found necessary in Ceylon. The latter variety yields a less valuable crop, but its vigorous growth and larger yield may prove compensating advantages.

11. Experiments to test various modes of combating the disease are in progress upon an estate in Matale, but no results can be anticipated till after the break of the north-east monsoon.

12. The chief work of a specialist if obtained would be to investigate the life history of the organism to which the disease is due. Once provided with such knowledge we should be in a better position to intelligently apply remedial measures. The actual remedies or preventives usually applied in the case of fungus diseases are already well known to skilled agriculturists, but their success commonly depends upon their being applied at a particular time in the life of the parasite causing the disease.

13. We are of opinion that the bulk of the old red variety in most districts of Ceylon is doomed to gradual extermination as a profitable crop, and that therefore it would be better to continue to replace it with the hardier varieties than to expend much time, labour, and money in endeavouring to retain it. In favoured spots the more delicate variety may survive uninjured for many years.—JOHN C. WILLIS, Director, Royal Botanic Gardens; E. ERNEST GREEN, Hon. Government Entomologist.

Peradeniya, July 27, 1897.

SUGGESTIONS FOR TREATMENT OF TREES ALREADY AFFECTED, AND FOR PREVENTION OF FURTHER SPREAD OF DISEASE.

Diseases in plants are closely similar in cause, in action, and often even in nature, to those in animals. They are as a rule only serious when the organism is already weakened in some way. The old idea that a disease was always to be cured by administration of some definite remedy or drug is now dying out even in popular repute, and it is beginning to be more fully understood that the proper mode of treatment is to assist nature in throwing off the disease by placing the patient in such conditions of food, rest, &c., as will best prevent further weakening and tend to bring up the general health and strength. The use of drugs, &c., usually plays but a secondary part in the treatment. For the successful application of such treatments a thorough knowledge of the general constitution and previous history of the patient is of the utmost service. Hence comes the well-known fact that an intelligent family physician is often able to treat a patient whom he has long known much better than any specialist. Even when the family physician himself has been at fault and has had to have recourse to a specialist, the remedies suggested by the latter are often best applied by the former. The same is true in the case in hand. Whilst remedies and treatments may be suggested by scientific men, it is for the individual planter to decide for his own estate their application. He is, or should be, best able to decide which, if any, of the suggested causes is the one to which the weakening of his trees is due, and which, if any, of the remedial measures should be applied.

In paragraph 9 of our report we have called attention to some common causes of weakening of the trees.

The disease seems most often to have appeared first in very damp shady places. Drainage of the soil and very gradual reduction of shade may help here. It should however be remembered that reduction of shade increases the yield, and if this be allowed it will equally weaken the trees.

The disease is constantly found round holes in the bark, where water lodges, whether made by boring insects, by cutting the stem to remove borers or by removal of suckers. When wounds are made they should be covered with tar, tar and coconut oil mixed in equal quantities, tree wax, or other waterproof substance. It is however of little use applying these things at times when the sap is running up in large quantity (so that the stem bleeds when cut), for they will not then adhere properly.

No more injury than is unavoidable should be caused in removing borers. Many trees that we have seen have been so hacked that it is a wonder how they have survived. Hacking the bark and pruning are two totally different operations, and while the latter may be beneficial the former in itself is not so, though it may be necessary in the removal of other causes of damage.

When only a few spots of disease appear among vigorous trees, it will probably be found sufficient to cut out the diseased part completely and cover the wound as directed above.

When a stem is really badly diseased it should be cut down at once, the cut being made below the lowest diseased parts. Suckers will often spring from points below the lowest diseased portions and form healthy stems.

When, however, a tree is dying away it should at once be entirely removed and its place supplied by a new plant.

All diseased parts, stems, or trees, whether dying or dead, should be at once burnt.

In areas where the disease is very marked the supplies put in should never be of the old red variety, but of *Forestero* or other hardy kinds.

In areas where the disease is really very bad, so that most of the trees are dying, it would be better not to plant the land in cacao, if possible, till a few years have elapsed, but to put in some other crop for a time. Rotation of crops is one of the chief preventives against disease known to agriculturists.

Great care should be taken in selecting seed for sowing. Only seed of perfectly healthy trees growing in districts free of the disease should be used, and it would be better to obtain seed from abroad as far as possible.

If the supplying with *Forastero* be done gradually so that the trees of this variety remain mixed with trees of the old red kind, the pods and seeds produced on the former will usually be found to show more or less of the *Criollo* character in colour, breaks, &c. This is due to the *Criollo* flowers being carried to the flowers of the *Forastero* trees by insects, &c.

INFORMATION DESIRED.

We shall be grateful to planters of cacao for any information relating to the disease; its prevalence, the time of its appearance, whether it attacks young trees or *Forestero* trees; its probable causes; any remedial measures tried, and their results, and so on. In making use of such information no names or places will be mentioned without special permission.

JOHN C. WILLIS, Director, Royal Botanic Gardens.
E. ERNEST GREEN, Hon. Government Entomologist.

THE ROYAL BOTANIC GARDENS' CIRCULAR *IN RE*—CACAO.

Sept. 9.

DEAR SIR,—It is strange that in the first circular from the experts on the subject of cacao canker (so-called) no attention has been drawn to the beneficial results of using coral-lime and wood-ash. For years soils have been manured with cattle bulk, compost, bone dust, and bone meal, castor, superphosphates, guanos, cotton-seed and coconut poonac, and perhaps a little nitrate soda and sulphate ammonia; but in very few instances, if in any, has an *adequate* quantity of *lime* been applied. It would be interesting to know what amount of lime has been used the last ten years; but it is pretty certain the quantity per acre would work out absurdly low. A good proportion of cacao lands has been formerly cultivated in coffee, and we may fairly assume that in coffee days there was the same failure in

applying lime and wood-ash, so that we have soils which have been forced to yield all the coffee that could be raised, undergoing the same treatment under cacao, and now we are reaping the consequences.

Mr. Willis and Mr. Green however disarm criticism and invite assistance and suggestions, and I now venture to call on fallen cacao planters to work together to find out what is really best, under varying circumstances, in the way of prevention and cure.

Undoubtedly in some soils castor and bones help trees to throw off the attack, and in some cases the use of McDougall's wash—sulphur and tar,—after shaving off the affected bark, has prolonged the life of trees, enabling them also to go on cropping.

In tea we find "Symplocos obtusa" (the Singhalese Bōmbu) very fatal to plants over a year old, *i.e.* after the stem is killed or uprooted and the roots left in the soil have begun to rot. They get covered with fungus which spreads, and attacks the surrounding tea roots in a heartrending fashion. It is very possible the thinning out of shade in cacao has a corresponding effect, and here again the digging in of freshly burnt coral lime is useful.

Mr. Willis deserves the thanks of planters for initiating these R. B. Gardens' circulars, and Mr. Green for his enthusiasm in the cause. Our part now is to assist them as far as lies in our power by taking the trouble to use the means recommended, carefully observing and reporting results.

T. KOKO.

P.S.—Cacao is thoroughly worth persevering with, and unless one is very much mistaken, consumption will largely increase and prices improve.

PLANTING NOTES.

Factory Bulking.—We specially direct the attention of our Ceylon tea planters to the advice which Messrs. W. Moran & Co. of Calcutta give to Indian planters (in their Report quoted on another page) as to the importance of careful bulking in the factory. More than ever does this require to be attended to.

Coconuts and Copra.—While the price of coconuts is given as R35 per 1,000 in or near Colombo, it is R30 for selected nuts at Kurunegala and beyond, and only R27 on estates beyond Chilaw. The question is, therefore, asked as to whether it would not pay better to convert nuts on remote estates into copra than sell at R27? What do planters with experience of both courses, say to this?

Proceedings of the Agri-Horticultural Society of Madras.—April-June, 1897—have reached us. Here are a few paragraphs:—

Acacia auriculiformis of North Australia.—A young tree of the above fruited for the first time last Dec. It was planted in October, 1894, and is now 25 feet in height with a girth of 15 inches at three feet from the ground, this is a favourable growth as the generality of Australian plants do not take kindly to our climate. A small quantity of the seed has been saved and will be distributed to members asking for it.

Paddy seed to Colombo.—Read letter from the Superintendent, School of Agriculture, Colombo, dated 6th April, 1897, thanking for the two varieties of paddy sent by us at his request in March last, and promising to send shortly some seeds of Milletia sp. which makes a pretty flowering tree for parks or roadsides.

Sorghum seed for Colombo.—Read letter from the Superintendent, School of Agriculture, Colombo, 20th May, forwarding a packet of seed of Milletia sp. and asking if we could send him some Sorghum seed.

Cork Waste.—Mr. T. Christy gives us some curious information on another page in reference to this product and he asks for hints as to further uses, from Ceylon. Meantime we should like to know if the cork tree, *Quercus suber* could not be grown in the drier parts of the island?

A Tea Factory—on the uttermost borders of Uva and amidst palm trees, is the description given in a chatty letter on page 278 of the Factory just erected for Walton Estate, Moneragala, by Messrs. Walker & Greig. This indicates both Planting and Engineering enterprise of no ordinary type and of itself ought to hurry on the new road and bridges to enable the tea to get to the Railway.

Plantains Galore.—The Demerara *Argosy* reports a bunch of bananas in British Guiana that weighed, with the stem, 135 pounds. It was the Chinese variety known as *Musa Cavendishii*, similar to the same variety raised here for export. This monster bunch had ten "hands," with a total of 192 bananas or "figs." The largest hand weighed twenty pounds and the bunch filled a barrel. Such large bunches are not desirable for export, as they are so unwieldy in handling.

The Florida Pineapple—says an American paper—has established the standard of excellence. Nowhere else in the world is better fruit produced, and nowhere else do influences combine to produce more excellent fruit. The climate, soil and methods are all perfectly adapted. Add to this, quick transit, which will permit the fruit to nearly ripen perfectly in the sunshine before shipment, and one can begin to account for the lack of core, the tender pulp, the delightful bouquet, and the delicious flavor of the Florida pine, grown in a territory less than 200 miles long by not more than 25 miles wide.

"The Agricultural Gazette" of New South Wales, July 1897. Contents:—Useful Australian Plants, J. H. Maiden; No. 39—A Red Box (*Eucalyptus Bosistoana*, F. v. M.); No. 40—Comet-grass *Perotis rara*, R. Br.); Botanical Notes—A Fodder Plant for the arid interior (*Portulacaria Afra*, Jacq.), the Alleged Poisonous Nature of Sorghum, Pepper-tree Oil; The Sheep Fluke (Part I.), N. A. Cobb; Explanatory Note on the Analysis of Fertilizers, F. B. Guthrie; Separated Milk as a Food for Calves, M. A. O'Callaghan; Influence of Bees on Crops, A. Gale; Poultry Food, J. J. McCue; Winter Dressing against Black Spot, M. Bluuno; Orchard Notes, Geo. Waters; Practical Vegetable and Flower Growing, W. S. Campbell; Geueral Notes; Replies to Correspondeuts; Agricultral Societies' Shows; Label for Specimens.

Liberian Coffee, &c. in the Straits.—A recent visitor to the Straits from Ceylon writes:—"I had a most enjoyable trip," but was too much rushed. There was no doubt that Liberian coffee has found its habitat in the Straits, where it grows most luxuriantly, but this terrible fall in price from $44 to $25 per pical is very alarming to those interested. I cannot help thinking, though, that much might be done to improve the sample by more careful drying and by picking and sizing it, like on Ceylon plantations; the bean has a most excellent flavor, and one cannot detect it from "Arabica" when carefully made and roasted. Kuala Lampur is one of the prettiest towns I have ever seen, most excellent public buildings and well kept park and surroundings, in fact, one of the most striking effects in the Straits and more especially in Singapore is the neat aud trim appearance of the compounds, frequently some acres in extent, surrounding the bungalows. Colombo residents might take a hint with much profit.

COCONUTS AND COPRA.—Certainly, writes a correspondent, the more distant districts should send their copra to market, and not their nuts. The weight of the kernel alone is reduced by one-half by drying; add to that the cost of transport of the shell and the water which are thrown away; and you will see how carriage tells.

CACAO DISEASE AND THE R. B. GARDENS' CIRCULAR.—We call attention to the letter of a practical cacao planter on this subject. It is quite evident that cacao disease is far easier to grapple with than leaf disease or bug in coffee, if only *systematic* care is exercised and careful observation made. Separate cacao trees can be treated in detail, and reliable results arrived at, when there are only 300 to the acre—far more so than was the case with coffee Arabica with 1,200 bushes to the acre. Our correspondent advocates the use of lime and wood ashes for the benefit of trees affected: the experiment is well worth trying.

"ROYAL BOTANIC GARDENS' CIRCULARS."—We call attention to the letter of the Director on this subject, to his introductory notice and to the first of the series of periodical Circulars, all of which we reproduce in full today and welcome with much pleasure. Such periodical deliverances on certain products cannot fail to be useful, and for our own part, as reproduced regularly in our monthly *Tropical Agriculturist*, they cannot fail to increase its interest and usefulness especially to readers in other tropical Dependencies. The discussions sure to arise in the daily press, out of certain of the Circulars as time rolls on, will also be of service when recorded simultaneously in our periodical. In the present case—the circular upon the cacao disease and suggested remedies—there is not much to be said, as the matter has recently been very exhaustively treated in our columns. But we notice that Messrs. Willis and Green are not very hopeful about the old Criollo cacao and strongly recommend all further planting to be with Forastero.

BRITISH CENTRAL AFRICA.—Mr. John M. Moir, one of the oldest and leading coffee planters in Nyasaland, was to leave Edinburgh on 28th August for B. C. Africa. Mr. Moir sends us an advance copy of his paper for,—

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Toronto, 1897.—The Climatology of Africa. —Sixth Report of a Committee, consisting of Mr. E. G. Ravenstein (Chairman), Sir John Kirk, Mr. G. J. Symons, Dr. H. R. Mill, and Mr. H. N. Dickson (Secretary). (Drawn up by the Chairman.)

In the present report we are able to publish abstracts of two years' observations made by our old and valued correspondent, Mr. J. M. Moir, at Lauderdale. Mr. Moir is, after a holiday at home, about to return to Nyasaland; but his work has been continued during his absence by Mr. Thomson. We are also enabled, through the courtesy of Mr. A Sharpe, to publish rainfall observations for ten stations. Earlier unpublished observations for Livingstonia have been added from the note-book of the late Mr. Stewart.

RAINFALL IN NYASALAND—YEAR 1896.

	Inches.
Chiromo	34·39
Chikwawa	28·78
Cholo (Nyamteti Estate) ..	51·26—81 days
Mandala (Blantyre) ..	52·00
Zomba (Residency) ..	63·34
Mlanje—Lauderdale ..	108·15
Nyasaland Coffee Co.	78·54
Fort Johnston—Fort ..	42·20
African Lakes Co.	45·74
Likoma (Univ. Miss.) ..	50·58
Bandawe (Livingstonia Mission)	92·59—126 days

COTTON.—The experiment made with seeds of the best kind of Egyptian cotton in the Horticultural Gardens, Lucknow, gives promise of some success. The plants are profusely covered with blossom, and it is hoped that they will give a good deal of cotton.—*Pioneer*, Sept. 11.

FISH GUANO.—A Ceylon reader writes us from Kandy that Fish Guano has been tried on tea with very poor results. The favourite fertilizer employed is nitrate of soda. A comparison between the two is of course impossible without the fullest data, but we cannot help thinking that the guano has not been given a fair trial. We hear it is a new but great favourite with coffee planters in South India.—*Planting Opinion.*

THE "INDIAN FORESTER," edited by J. W. Oliver, Conservator of Forests, and Director of the Forest School, Dehra Dun, August 1897.—Contents: Original Articles and Translations—The Export Works in the Bamsu Forest (illustrated) by G. E. McA. M. Correspondence—Irregularity in the Growth of Teak, letter from S. C.; The number of acres in a Cape Morgen, letter from A. W. Heywood. Reviews—Forest Administration in the Northern and Central Circle of Bombay during 1895-96. Extracts, Notes and Queries. Timber and Produce Trade. Extracts from Official Gazettes. Appendix Series of the Indian Forester. Reports by E. E. Fernandez, Esq., (Report of Pine in Germany and Switzerland), Consr. of Forests, Part III.

TAPIOCA AS A FOOD CROP.—The *Englishman* remarks that a good deal of correspondence has been taking place on the subject of the introduction into India of the Manioc or Mandioca (Tapioca) plants of South America as an alternative food-crop in times of prolonged drought and famine. It appears that the proposal emanated from Dr. Halliday Gunning, who has resided for a long time in Brazil, and is of opinion that the plant could be used as an alternative food when the rice-crop failed in rice-eating districts. It is pointed out that tapioca is already regularly cultivated in the Dinajpur, Rangpur, Bogra, and Jalpaiguri districts of Bengal. The yield per acre is very large. In most parts of India, however, the people have a prejudice against eating the root, and it is grown merely as a hedge plant. Any attempt, therefore, to introduce the plant generally as an alternative for rice would probably fail, though its cultivation might be encouraged in Northern Bengal, where the people are accustomed to regard it in the light of a foodstuff.

PRONUNCIATION: "COCAINE" (8th S. xi 485). —The note referred to is in several particulars somewhat misleading to the *simplicitas laicorum.* What is meant by "words of this formation" I do not quite understand, but there are many words, apparently formed on the same principle as those referred to, in which the termination *ine* does not denote an alkaloid, as, for example, iodine, bromine, glycerine, chlorine, crocine, and carmine. Nor is it quite correct to say that an alkaloid is the active principle of a thing. Many plants yield half a dozen alkaloids, none of which can properly be said to be the active principle of the plant. Opium, for instance, yields, besides morphine, papaverine, thebaine, codeine, narcotine, narceine, and probably several more, each of which has properties of its own, none of which has precisely the same value as any other. There are alkaloids, too, which occur in more than one plant (caffeine, for instance, occurs in both tea and coffee), and there are animal alkaloids, and artificial alkaloids almost without end, to which your correspondent's description would not apply.—C.C.B.—*Notes and Queries*, July 10.

THE TEA TRADE OF THE FAR EAST: SOMETHING FOR THE "COMMITTEE OF THIRTY" TO PONDER OVER:

AN INCREASE, RATHER THAN DECREASE, IN TOTAL TEA EXPORTS FROM CHINA, JAPAN, AND FORMOSA; LARGE TOTAL CONSUMPTION OF FAR EAST TEAS IN RUSSIA AND AMERICA.

The friends of China tea who bemoan the falling-off in exports to the United Kingdom and Australasia, take good care to avoid all reference to the development of the trade in other directions. It is only when we get all the figures brought together that we are able to see that in reality the China tea-growers have not suffered even now, any diminution whatever in the demand for their produce. The confusion arises from the British merchants and Press in China taking little or no cognizance of the trade in "brick tea" via Kiachta to Russia, which has enormously developed in the past 25 years, nor do they even give returns of the "leaf teas sent via the Han River and Fanching," which do not come under the cognizance of the Foreign Customs. Then, again, another element of confusion of late is that the Formosan export of tea is now being connected with Japan, whereas it was formerly given with the figures for China tea. The only way, therefore, to get a fair comparison between the past and present export trade in China and Japan teas, is to put the whole together as we attempt to do in the following statement:—

EXPORTS OF LEAF TEAS.

From	*To*		*1871.*	*1896.*
China	U. K.	.. lb.	138,915,733	29,254,533
Do.	U. S.	.. „	39,806,533	30,146,000
Do.	Russia	.. „	4.277,333	45,179,066
Do.	Australasia	„	12,269,200	6,258,800
Do.	Sundry places via Hongkong	„	17,511,601	40,575,068
	Total (Leaf Tea)	..	212,780,400	151,413,467
Do.	via Fanching to Russia	.. „	12,149,600	10,439,600*
	BRICK TEA.			
Do.	Russia	.. lb.	11,172,000	76,949,200†
	Total for China proper	„	236,102,000	238,802,267
Japan and Formosa to	America	.. „	18,750,000	62,064,000
	Total Far East Teas	..	254,852,000	300,876,267
	British-grown Teas	..	15,351,600	215,405,000
		lb.	270,203,600	516,381,267

Here, then at a glance, it can be seen that the China tea-growers so far from exporting less tea in the 25 years, have actually, delivered 2,700,000 lb. *more* in 1896 than in 1871, and that Russia has fully made up to them for the less demand from the rest of Europe, America and Australasia. Then we have the export trade in "Japan and Formosa teas" developing from $18\frac{3}{4}$ million lb. in 1871 to 62,064.254 lb. in 1896.

Let us now consider what the Russian and American markets still continue to take of the tea produce of the Far East,—of China, Formosa, and Japan. Here are the figures for

TEA IMPORTS INTO RUSSIA.

	1871.	*1896.*
	lb.	lb.
China: Congou and green Tea via Odessa ..	1,984,000	23,285,333*
Do. „ Northern Ports ..	2 293,333	21,893,733
Do. Leaf Tea via Fanching	12,149,600	10.439,600
Do. Brick Tea via Kiachta	11,772,000	76,949,200†
Total..	27,598.933	132,567,866

Here we have an enormous development of the Russian tea trade in the 25 years, and the fact should be realized that if we could only get the Russians to use Indian and Ceylon teas, our increased production would be required for a good many years to come. So with America if we put all the figures together thus,—

	1871.	*1896.*
	lb.	lb.
China (Leaf Teas) ..	39,806,533	30,146,000
Japan and Formosa ..	18,750,000	62,064,000
	58,556,533	92,210,000

Here, again, we have a large margin to go on in the total of $92\frac{1}{4}$ million lb. of Far East Teas consumed in America. Taking Russia and the United States together, we face a total consumption of 224,777,866 lb. of China, Formosa, and Japan teas, and how to supplant this by Ceylon and Indian teas is the great problem of the day for the tea planters in both countries,—for the Ceylon "Thirty Committee" and for the "Tea Associations" in Calcutta and London. The campaign has already gone on for several years and something more than a foothold has now been gained in both countries. May we see the introduction of our pure wholesome teas into Russia and North America, henceforward increase not at an arithmetical, but at a geometrical rate of progress, and so find our export to these countries doubling every year, until a victory is attained as complete as that already achieved in the United Kingdom and Australasia.

* Varies greatly year by year: 1879 = 193,733 lb. 1895 = 1,799,600.
† Including 2,717,733 lb. via Odessa.

* Including 631,733 lb. green tea (Hysons) shipped to Batoum.
† including 2,717,733 lb. via Odessa.

COFFEE, NUTMEGS, RAMIE AND COCONUTS AT THE STRAITS.

FROM REPORT BY THE ACTING DISTRICT MAGISTRATE, (A. W. JUST) MATANG, FOR JULY.

On the 29th July I went by launch to Kampong Dew, snd stayed the night at Yam Seng estate, The next morning Mr. Waddell Boyd took me over Selinsing estate. I suppose this is the first time Selinsing estate has been heard of, and certainly it has sprung into recognition very rapidly, and gives already most hopeful promise. It lies a little back from the Kampong Dew road, on both sides of the river, so that from the road nothing of it can be seen, but what it loses in lack of road frontage it gains in having a long river frontage, which will be most useful for the future of the estate the block that lies to the north of the river Sapetang will be twice the size of the block to the south.

The land on the north of the river, a block of 420 acres, is the part of the estate at present being opened up, and is of the very best quality: 130 acres are already felled and cleared ready for planting. The nurseries consist of:—70,000 coffee plants, put in in April, now four to six inches up cut of the ground; 40,000 coffee seeds, not yet above ground; 8,000 nutmeg plants, planted at the same time as the coffee, in April, and now well up; 2,000 nutmeg seeds, not yet up (of the nutmeg plants Mr. Waddell Boyd is particularly proud); ramie—this is not in large quantities but the quality seems good; 3,000 coconuts.

PLANTING IN REUNION:

SUGAR, VANILLA, COFFEE, &c.

(From Report by Consul Bennett.)

There still remains, however, plenty of land fit for cultivation besides the sugar belt running round the island, and up to about 1,500 ft. on the slopes. The upland plains of Salazie, Pilaos, Plaine des Cafres, Plaine des Chicots, and Dos d'Ane, among others situated at from 3,000 to 5,000ft., are all cultivable, and, except the Plaine des Chicots, more or less cultivated, but from 5,000ft. upwards the soil is practically non-existent, and cultivation is impossible.

SUGAR AND VANILLA.—"The Reunion sugar culture has been fully explained in my report above referred to, and calls for no further remark, except to observe that the fall in the price of sugar and the beet competition have been felt almost as acutely in Reunion, in spite of Protection, as in the British West India colonies. A distinction, however, must be drawn between planters and millwoners. In spite of hard times, millowners have been able to offer to planters prices for canes brought to the mill to be crushed which have given fair profit to the planter. The better the mill the better the sugar product, and, therefore, if the planter elects to be paid in sugar, the bigger profit for the planter who chooses the best mill available. It is the millowner who has chiefly felt the pinch. Centralisation of mill has long been recommended, and under given circumstances works well. Decentralisation, *i.e.*, division of labour, would perhaps, work better, the millowner striking to his trade as miller and the planter to his as planter, mutual contracts existing between millowner and planter as to lands to be cultivated and the labour to be supplied on more or less the lines of the Queensland Sugar Acts. But Reunion would be in a far worse plight today than she actually is if she had depended entirely upon sugar. It is hardly too much to say that her planters, or many of them, have been saved from ruin by having a second string to their bow. Many a deficit on sugar has been covered by a handsome profit on vanilla, backed up by sales of manioc, coffee, tobacco, perfumes, cloves, and market garden produce. The largest of all these secondary [products is undoubtedly vanilla. There is hardly a sugar estate in the island which has not more or less land under vanila varying naturally in extent according to the nature of the locality. On the other hand, in certain districts are to be found large planters who cultivate nothing but vanilla, and as regards the quarters of Ste. Rose, St. Philippe, and St. Joseph, it is no exaggeration to say that the mainstay of the people is vanilla. The yards and courts and little plots of ground round the huts are covered with the vanilla creepers. When the pods are ripe they are sold green to a neighbouring merchant, realising] quite a small fortune for the grower. The only drawback to this crop is that it gives rise to an immense amount of theft and dishonesty. The pods are stolen by night, and in spite of stringent laws are passed from hand to hand, and finally lost for ever to the grower. Many considerable fortunes are known to have been accumulated by illicit vanilla buyers, but the detection of the culprit is almost as difficult as that of a diamond thief at the mines.

SELF-SUPPORTING ESTATES.—In conclusion, Consul Bennett writes: The main industry will be seen to be sugar; coffee and vanilla and tapioca forming the only serious aids to counteract low prices and losses on sugar. But the fact must not be overlooked that large Indian corn, bean and pea crops are grown upon all estates, and that market garden produce is largely cropped either for family consumption, for supply to neighbouring towns, or for export to Mauritius and Madagascar. With the exception of flour, beef, and rice, all of which are imported, a well-managed Reunion estate is practically self-supporting as regards men and beasts and fuel for the mill, for no coal is used in the mill furnaces; and according to its vicinity to town or railway can make a considerable yearly income by the sale of market produce, &c. Continuous efforts are made to substitute Indian corn, peas, beans, lentils, and mandioca for imported rice, and one of the results of the plague at Bombay has been to very largely aid in forcing the inhabitants to look to native products in view of the great rise in the price of rice. As a rule, however, the market gardner is sadly hampered by want of means of communication; he can grow beautiful produce, but before he can reach the consumer freight has eaten up the profits. Neither are export duties charged at the ports favourable to the development of a trade with foreign or neighbouring countries. Something has been done to save the island from depending solely on sugar, but there is room for improvement. Reunion ought to grow all its own corn on its fertile upland plains. Horse and cattle rearing could be profitably extended, and sheep-raising on a smaller scale, with the by-products of soap, candles, and manures.

PLANTING &C. AT THE STRAITS.

The Acting District Officer, Ulu Langat (Mr. O. F. Stonor), Reports for July:—

Advantage has been taken of the moderately dry weather of the past six weeks to burn off numerous clearings throughout the district, many with but average success, owing to the enforced delay during the recent prolonged rainy season, and a consequent anxiety to take advantage of the earliest opportuniiy.

Padi, at the time of writing, is being transplanted from the nurseries, to the fields and the people are looking forward to a prosperous year, should present prices be maintained.

That energetic miner planter, Mr. Goh Ah Ngee, has applied for a grant in respect of 29 adjoining customary holdings near Semenyih (measuring altogether some 550 acres) which have recently been transferred to his name. I have referred in former reports to the promising work being done on this estate, which is, for the most part, worked by Christian Chinese.

Amongst native coffee growers I am glad to notice signs of an increasing belief in the practice of "topping" the trees—a practice which is, I believe, generally advocated by European planters. The condition of many of the older Malay gardens is certainly no advertisement to the contrary, though the systematic cultivation of lalang, and various sorts of weeds, has probably more to do with the result achieved. Remonstrance is invariably met with the plea of want of labour, the proprietor preferring to concentrate his energies on crops which yield a quick return, and leave the coffee to take its chance.

Good progress is being shown in the construction of the Sungei Cheow Road bridge over the Langat River. To enble the metalling of the road to be proceeded with forthwith, and to provide better means of access to the temporary railway station, it has been decided to construct a connecting road between the present foot-bridge and the Sungei Cheow Road, of sufficient width to carry a light line for trucks. Work is now in progress.

The opening of the railway extension is expected to take place during August, rails have been laid, at the time of writing, as far as the temporary station.

I am glad to notice a steam roller at work on the Cheras Road, the surface of which has long been a source of supreme discomfort to travellers.—*Selangor Government Gazette*, Aug. 27.

The District Officer, Ulu Selangor (Mr. R. C. Grey), Reports:—On the evening of July 27th there was a slight disturbance in Kuala Kubu village. Some thirty or forty Chinamen, armed with sticks, effected an entrance to a brothel and committed an assault on one of the inmates, against whom they had a grudge. On the police interfering some of them were beaten also. The following morning twenty-five mining coolies were charged before me with riot and four men convicted. Serjeant-Major Mat deserves great credit for the prompt action he

took in the matter. Although all the rioters had at first got away, he had a shrewd suspicion of the kongsi to which they belonged, and proceeding there very early the next morning with a body of police, he arrested all the inmates. Though only four could be convicted there is little doubt that the whole party took part in the disturbance. Small fights in the village have been very frequent of late and it is to be hoped that this will have some effect in stopping them.

On the 28th I went with Mr. Edmonds to Kuang, where we met several Malay padi-planters, under the Penghulu, Raja Isa, who are anxious to start padi planting on a large scale there and are desirous of asking the Government to help them to dam up the Sungei Kuang and divert it into some hundreds of acres of low-lying land at Kuang. I have already reported on this subject

On the 29th, early in the morning, we walked over Mr. Pasqual's coffee estate with him. Mr. Pasqual has done very good work on the estate in a very short time, but he has been put to much inconvenience owing to the delay in the survey of his estate.—*Selangor Government Gazette*, Aug. 27th.

JAVA CINCHONA—ROCK-BOTTOM REACHED.

The annual report of the Society of the Java Cinchona Cultivating Company, "Garoct," of Amsterdam, states that the year 1896 has resulted in a net loss of 582 florins (about 50*l*.), which, added to the loss of the previous year, makes a total loss since 1894, of 16,351 florins. The total expenses during the year amounted to 16,269 florins, and the revenue of the 54,690 kilos. of bark, sold at auction in Amsterdam during the year to 15,687 florins. The prospects are considered fairly satisfactory, but the directors propose to harvest only so much bark as is absolutely necessary, in order to allow their plantations to mature.—*Chemist and Druggist.*

B. C. AFRICA.

(*Central African Planter*, July 10.)

Mr. Israel is to be congratulated on having obtained a maiden crop of 20 tons of coffee from an acreage of about 48 acres. This output is an encouraging prospect for the future industry of Coffee in B. C. A.

We understand that Mr. Crabbe will not return to the management of the Nyasaland Coffee Company's estates. Mr. Moggridge has been appointed Manager. The Company is to clear 150 acres this season, which will make a total of 400 acres odd and this having been undertaken in two years shows there is no lack of labour.

Several other clearings are being opened in the Mlanje district which will add a few more hundred acres to the area now under cultivation. Mr. Boyd has assumed charge of Mr. Bradshaw's Estates.

"THE AGRICULTURAL LEDGER."

1897—No. 5 is the value of Silt as a manure. A note on some experiments which have been made to test the value of Canal Silt. By Dr. J. W. Leather, Agricultural Chemist to the Government of India.

1897—No. 6 is the tinctorial properties of Kaiphal Bark and an analysis of the colouring principle. By professor John James Hummel and Mr. Arthur George Perkin. With an introduction by Mr. David Hooper.

1897—No. 7. Reclamation of Reh or Usar Land. Note by Dr. J. W. Leather, Agricultural Chemist to the Government of India, on certain experiments which have been carried out for that purpose.

A TRIP ON THE BOUNDERIES OF UVA.

Having passed Buttala where there is a Dispensary which distributes the much-needed and beneficial quinine,—we reached

KUMBUKANA

where there is another resthouse. Not the usual type but an "upstairs' bungalow." Just in front the hill of Moneragala towers up, and looked quite imposing after the long level sketch of feverish country we had come through. At its base near the village of Mupane Messrs. Walker and Greig, Haputale, are building a large

TEA FACTORY

for Walton Estate. It is near the cart-road and the tea is to be sent down from the hill above, by the usual method of wire-shoots.

This picturesque factory, situated in the midst of palm-trees, was only begun in the end of May and was to be completed by the 1st September. When one considers the tremendous difficulty of getting heavy materials and machinery over such a road, the feverish district, and many other obstacles, it says a great deal for the enterprise of the firm, that their engineer has been able to do it in such a short space of time. It seems to be the beginning of opening up a new district, and when the two rivers between these and Wellaya are bridged, there will be a passable outlet for the produce—right up to Haputale station.

ECHOES OF SCIENCE.

Catching Insects by Electricity.—In these long summer days thousands of amateur naturalists are enjoying the fresh air of the woods and fields in hunting for specimens of insects, but probably few are aware that the electric light can render them a great service in this respect. Light is a fascinating lure to insects, fish, and wild creatures. Entomology has lately utilised this fascinating effect of light on insects, by employing it to draw them into a pond, net or trap. An electric glow-lamp of three or four candle-power, fed by a small battery such as cyclists use for lighting their machines, is fixed to the trap, which is lowered into the water. The current is switched on, and the light shines out. Ere long, insects, frogs, newts, and fishes gather round the strange light, and are easily caught.—*Public Opinion.*

ABYSSINIAN COFFEE.

It is interesting to note in Mr. Rennell Rodd's report on the trade of Abyssinia, just issued, he refers to—as if the matter were of no importance—to the fact coffee grown there is largely consigned to Mocha, whence it is exported as the genuine product of the place. It matters little, perhaps, now that Mocha figures so lightly in our imports, but it would have grievously affected Dr. Johnson and the wits who assembled in the first coffee-houses of the City to learn that the "heavenly decoction" came not from Arabia Felix but from the Dervish country. And yet coffee which is indigenous to Abyssinia, takes its name from Kaffa, where from time immemorial it has been cultivated where now the greater part of the product of the country is raised. Were it not for the peculiar customs of the country which retard commerce instead of fostering it, we should get a quantity from King Menelik's dominions, for the finest berries in the world are grown there.—*Grocers' Journal*, Aug. 21.

Coffee Planting in New South Wales.—It is rather curious that Reuter should telegraph from London this piece of news of the premier Australasian colony encouraging coffee planting! Our information goes to show that Northern Queensland offers a far better field for coffee than even the rich lands in the N.-E. portion of N. S. Wales; for one thing we should fear frost in the latter.

"HOW TO ECONOMISE THE AVAILABLE LABOUR SUPPLY ON OUR TEA PLANTATIONS."

REVIEW OF LETTERS NOS. X. TO XVII.

The last eight letters must now claim our attention ; and they are full of variety and interest. "L" from the Northern Districts, is able through experience to anticipate the doubt which "M" from Matale North gives expression to later on in regard to the suitability of wire shoots for the transport of produce ; and the directness and confidence with which "L" asserts that he has "worked shoots for many years" and "for all purposes," illustrate one of the many advantages of the interchange of ideas for which we have arranged through our circular. *Experientia docet* ; and here is a writer who has used shoots "for sending firewood, tea leaf in coir bags, jungle soil for manure in gunnies etc., etc."; and all he stipulates for is that there should be "lots of packing" at the delivery end, so that the leaf may not be damaged, as it would be, if the impact were against the tree or rock to which the shoot is attached. The hesitancy of the unbeliever,—that is of the inexperienced,—should vanish before such testimony, supported as it is by "A" from a medium district, who has seen shoots used in the great saving of both labour and time on extensive and steep estates. In one case, he says there was a saving of five miles in transport through three shoots which took the leaf to the store in 20 minutes. What this means in coolies available for other work and exemption from grumbling, only those who have experience of shoot and coolie labour can appreciate. "R" from Uva tells the same story ; also "T" from Medium District and "T" from Northern District three-fourths of whose leaf is brought in by means of shoots ; while "G" in his lengthy and instructive communication, though having no personal experience of shoots, affirms that their use is capable of "very great extension and improvement." Experience of aërial tramways, too, confirms the general feeling in their favour ; and most of our correspondents doubtless regard them in the light of improved and more scientific shoots ; but there appears to be a consensus of opinion that the initial cost of rail tramways is prohibitory, and places them beyond the reach of any but the most extensive estates, and even in their case, if they can be easily roaded, light bullock-carts will be as serviceable while saving the heavy original outlay of a tramway.

On the question of lighter and less expensive Weeding, the present batch of letters shows, with one exception, the same conservatism as the preceding batch, and even some little impatience that the question should be revived. "Surely this question has been threshed over long ago" protests "L," who would have "a clean estate, or none at all"; though looking to the great deficiency of humus in our clayey soils, he would prefer to grow nitrogenous weeds—or say the Californian Cow Pea—and fork them in, if the labour were forthcoming. From Uva we learn that experiments have told against less frequent weeding, leading to the ultimate use of mamoties with disastrous results ; while in Dimbula the retention of mosses and ferns threw coffee back rapidly and seriously. "A" similarly sticks to clean weeding, both for its own sake, and as helping to satisfy the contractor-kangany ; while "M," who holds the same opinion, advocates the more general growth of shade as a means of keeping-off weeds and preventing wash. With that advantage, we fancy, must go the drawback of a falling-off of flush which needs sunlight to bring it out on hardening branches. The answer of "R" from Uva seems rather contradictory as he holds weeding overdone, while declaring that "in Ceylon we must have practically *no* weeds" and that "our present system is good enough, if scraping is fought against"; but "T" believes unequivocally in keeping an estate "thoroughly clean," though mosses do not injure tea on well-drained land. "T" from a northern district, on the other hand, would not leave any mosses, as they would form seed beds for other weeds, and in damp climates themselves choke up the trees and produce unhealthy barks. Against this body of opinion, we have a very decided dictum from "G" in a mid-district, who does not content himself with merely affirming that "weeding has been and is being overdone;" but offers reasons in support of his view which we commend to the earnest attention of our readers, and which we should like to see discussed and answered by the advocates of clean weeding at any expense. "G" points to the bare red soil on our hillsides, destitute of all humus and affording no lodgement for fresh accumulations of leaf-mould, as evidence of injudicious weeding which has not only cost vast sums of money which might have been saved, but has positively worked to the detriment of the land. Coffee found itself unable to survive such treatment, but tea as a deeper feeder is less dependent on surface soil. Yet, it must benefit by the conservation of humus ; and what "G." suggests seems very simple. He admits the impracticability of hoeing in the weeds, once in two or three months, as in India, on steep land, but would have a system of water-holes between every four trees, into which the weeds at every bi-monthly hand weeding—by which, we suppose, is meant the weeding once in two months and not twice a month—should be thrown. This would do more than give back to the soil the constituents which they had taken from it, by enriching it with the added nitrogen they have drawn from the atmosphere. At the same time, it is pointed out that there are mosses and other small plants which assist in the formation and retention of humus, and also serve to minimise wash ; and if such mosses and plants are selected with discretion, even the necessity for artificial manuring might be obviated. These mosses would be auxiliaries to the leguminous plants which have the special quality of absorbing nitrogen, if indeed they do not take their place to some extent, and they might also find a place in the water-hole, where the steepness of the land forbids their being hoed in. The supplementary information which our correspondent supplies on the weed which he thinks it would be well to encourage, to prevent wash and loss of soil—*Pilea microphylla*—is specially interesting, as is indeed the whole letter with its happy combination of the practical and the scientific. Our own inclination, as indeed our question in a manner suggests, is to the view that weeding is rather overdone : and although numbers have, so far, been against us, we are content with the measure of support which "G." affords with his well-reasoned advocacy of selective weeding,

On drainage, too, there is much useful information in the letters before us, all which agree in condemning deep drains far apart, and in giving preference to the more modern system of shallower drains at more frequent intervals. "G" certifies to the help he has obtained from cuscus in preventing wash; and he therein confirms the testimony of the low-country planter in the first batch of letters we last reviewed. On reference to the same planter we learn that he has found suitable permanent barriers in logs of wood or blocks of stone buried in the drain at intervals which would arrest soil and gradually clear the water of matter in suspension as it approaches the wells he provides at more distant intervals. But what answers for tolerably level land may not do for steep fields. On the questions of boutiques and taverns there is consider able diversity of opinion, traceable, we fancy, to differing conditions; but vegetable plots for coolies find warm supporters. There is one point to which we would invite special attention—the explanation which we have from Uva of the Arcadian happiness of the Principality. Its freedom from labour troubles is chiefly due to the length of time estates are under the same management. The cooly knows his master!

(Letters Continued.)

No. XVIII.—LOWCOUNTRY.

(1) Don't know enough to give any decided opinion.

(2) No experience in tea, so have had no opportunity of observing.

(3) Only in exceptional cases I should say.

(4 and 5) Yes; I have often thought so, but never could think of any weed that might be employed to protect the ground and save wash without being injurious to the tea or coffee. The entrance of grass would have to be carefully guarded against. Mosses etc., would do on high estates, but they would not grow to any extent below 4,000 ft. Some imported plant, of very *low* growth, would have to be tried. While this system would I believe be beneficial, I doubt its being labour saving.

(6) No. I am entirely against loosening of soil on even moderately steep land. The loss in soil is infinitely more than the temporary gain by loosening the soil for the roots to have a larger feeding surface.

(7) While not satisfactory I know of no better to take its' place. Some such plan as that you mention of growing *cuscus* above the drains would be advantageous. I have seen bundles of *maana* staked across the hill side, answer well.

(8) ————————

(9) During the months of heavy flushes a rupee per head might be given to every cooly who worked 24 days in the month. I tried this in the coffee days and it answered very well. So far as my experience extends any cooly who wishes for a plot of ground for a garden could have it; many, however, prefer to pilfer the fruit of the labour of others. I think that those coolies who do make a garden and *attend* to it are more loath to leave than those who have none.

(10) I cannot answer this question. If coolies are compelled to buy goods at any particular bazaar, though the goods may be first-class and reasonable in price they will grumble and think they are being imposed upon. They like to traffic where they please.

(11) I reside in the lowcountry where liquor shops are numerous; but illicit sale of toddy is the worst, It is cheap and a cooly can get drunk for a few cents. It is the sourse of no end of rows in the lines. The muster of coolies would decidedly be larger if liquor shops were fewer. (Signed) W. J.

No. XIX.—HIGH DISTRICT.

(1) No practical experience; have seen them working. Said to damage leaf, but I should not think damage would equal the advantage gained by the use of the shoot in saving labour. There must be a great advantage, again, to those who use them, in transporting firewood.

(2) Telephones, tavalams, wire tramways, cart roads where none existed before. Carts in the low-country.

(3) Could not easily be worked on steep estates, and would be too expensive on a majority of places.

(4) Emphatically no. Sometimes very underdone.

(5) Decidedly no. The cleaner the better for every thing and everybody concerned.

(6) No. Might be useful on flat land. But rather impracticable on steep.

(7) Where large (18 inches at least) drains are opened, and kept so, very satisfactory. Grevilleas might also assist to prevent wash, and keep up soil; but as a rule any extra growths prevent easy working of the land.

(8) Keeping labour well occupied, preventing loafing in the lines, this will cause the coolies to become more apt, when more work will be done, and so economise those available. Good and suitable tools also assist this end materially—a matter to which sufficient consideration is not always given.

(9) I do not think coolies having gardens matters in the least, one way or the other, to make them more contented. If they intend to stay on a place they will almost always have or make a garden. My experience is that they ask for and require more line room than they did formerly.

(10) I am not favourable to the increasing of boutiques or bazaars on estates as I think they are the next temptation to liquor shops for coolies not to work.

(11) I am not I am happy to say troubled here but I have known of the disadvantages of a liquor shop, elsewhere. Many quarrels would be prevented, and much labour to an estate would be gained by their reduction or abolition. In this connection I am afraid more illicit sale of arrack, than is thought, goes on on estates. Y.D.D.

No. XX.—MID-DISTRICT.

(1) Generally work very satisfactorily, and should be used far more than at present on tea estates, their great cost lies in "Runners" which are very expensive and wear out quickly, surely something more enduring could be provided? *cost* so long as the *runner is lasting* could be met. Have not found leaf damaged.

(2) None.

(3) Don't think so.

(4) Certainly not.

(5) No. Anything covering the surface of the soil prevents light and air reaching the feeding roots of the bush, and the plant sickens, even Grevilleas grow better where the surface of the land is kept free from weeds. I have a section of an estate that always gets covered with moss during the South-West monsoon, you would be surprised how the coffee used to, and now the tea improves when this moss is cut away with carandies in the early part of the year.

(6) No.

(7) The best we can do, if labour were always available would be to cut drains at a gradient to take off the water only, and at frequent intervals top dress with the accummulating silt. The sourness from cuscus or grass of any kind is objectionable to any kind of cultivated bushes. The roots also would injure one line of tea the whole length of the drain.

(8) Nil.

(9) On old estates where there is plenty of spare land, gardens are large, but those who cultivate them are generally friends of the kangani and seldom do any other work. The good estate cooly, who kept his little patch of ground and worked it for a few beans, chillies, etc., and never dreamt of its interfering with his ordinary day's work, is a man of the past. The more garden available, the less work there is from a cooly now.

(10) No, the cooly like everybody else prefers going to "London" to buy his provisions, where there is sufficient competition to ensure his getting all he wants at fair market rates, which he does not do in Estate kaddies: these are generally run by kanganies or their friends who give "tick," with the object of getting the individual cooly more and more into their clutches.

(11) Yes. The fewer liquor shops the better.

S.

XXI.—LOWCOUNTRY.

(1.) Where transport of manure and firewood is down-hill there is no question of the utility of shoots. For tea-leaf, wire tramways worked by power at the store will save crushing and damage, and loads can be sent up-hill.

(3.) My experience of tramways is confined to this estate where we have a 2 ft. tram. It saves a deal of labor. Each car fully laden (4,000 lb) is moved by four coolies.

(4.) Yes. I always thought that the system I have read of as applied elsewhere, of cutting down weeds, as the correct and scientific one.

(5.) When I was an up-country planter I always encouraged the growth of mosses and other low forms of vegetation as soil binders.

(6.) Mr. Holloway, shewed me some years ago a field on which he had experimented with green-manuring and it looked very well.

(7.) On Arapolakande, in the Kalutara district, terracing with stones between drains was successfully tried by Mr. J. Newman. Cuscus above drains is good. In the old coffee days I saw from a distance an estate with guinea grass both above roads and drains. Wash was said to be effectually stopped.

(9.) I would suggest that coolies who work 24 days and over a month be paid an increased rate of wages. Gardens are much appreciated.

(10.) We have enough of boutiques down this way and I do not think their multiplication will do much good.

(11.) Liquor shops, licit and illicit, are the curse of the country. Coolies who patronize them do not work steadily and they steal produce. B. W.

XXII.

(Engineer's Opinion.)

(1.) Yes! I have erected many, and they could be much more freely used than at present. If properly erected at an easy gradient (not too steep) they do not damage tea leaf.

(2.) Endless wire rope tramways could be very much more freely used and effect an *immense* saving in transport.

(3) Yes! but not on the average estate; but certainly a good many labour-saving appliances.

In my opinion, water power could be much more freely used, especially as regards estates having a small quantity of water and a large fall, where Pelton wheels are applicable; of which I have very considerable experience.

Many estates are now working with a steam engine the whole year round, and water power obtainable for say 8 to 10 months in the year, at very little cost.

Transport of firewood is often very heavy and a job the coolies don't care about.

ENGINEER.

XXIII.—LOW DISTRICT.

(1.) Yes. Where they can be used profitably, they have as a rule been put up. This applies to the transport of firewood, as on few estates can they be used profitably for the transport of leaf. No, not to any great extent.

(2.) None known-tramways.

(3.) Doubtful. Their first cost (I presume at least R1,500—2,000 a mile) would be too great and the amount of traffic relatively too small for the earnings of such lines to cover interest on capital. This applies to the ordinary estate where the factory is more or less centrally situated.

(4.) (5.) No. The soil is too poor to support anything but tea, which is a sufficiently heavy crop in itself. In new clearings especially, the cleaner the ground, the better the growth of the plants. Moss, however, when left does not seem to do harm, but it will only grow on certain spots. What is undoubtedly wanted is some plant that while spreading thickly over the ground and forming a mat would take little or nothing out of the soil. I know of none such.

6. No. It might be tried on flat land; but any such experiment on sloping land would through the thorough loosening of the soil only increase the amount of wash.

7. Fairly so, but the best means of stopping wash, would be the thorough terracing of new clearings before planting; impracticable on account of expense. I know nothing of the grass mentioned and am afraid unless the rows were planted very close al through the tea, it would be useless.

(8.) I think, in connection with transport of leaf, more use might be made of tavalam bulls for ordinary transport, where the factory is any distance from the work.

(9.) Yes, a cooly is undoubtedly less prone to leave an estate where he has his own patch of garden. Most lines have gardens round them.

(10.) Yes, a very good idea, especially if one or two boutiques were run in connection with or under supervision of the estates, coolies to be allowed to purchase so much per month, amount to be debited them in the Check Roll and paid to boutique-keeper at end of month. Estate to equalize prices, &c.

(11.) No. The curse of the cooly is not the liquor shop *per se*, but the illicit sale of arrack on estates brought either by outsiders or coolies belonging thereto. This is more prevalent than is generally known and is most difficult to detect. K. V.

NO. XXIV.—HIGH-MEDIUM DISTRICT.

(1) Yes! No, not at all events to any appreciable extent.

(2) I have seen nothing used in the matter of labor saving appliances other than what has been published.

(3) Where manuring is done to any extent, trams would no doubt, be very serviceable. I have, however, had no experience.

(4) Yes! where scraper or mamoty weeding has to be done it simply loosens the soil for the next rain to wash it into drains, and from thence to ravine or other outlet.

(5) Mosses tend to keep soil together; also, I think to keep ground moist in dry weather.

(6) Cannot venture an opinion.

(7) I have seen, on a small patch, a ledge of tea immediately above roads and drains, and it undoubtedly proved a barrier against soil being washed away.

(9) I am a great believer in letting coolies have a strip of garden ground, for if they ever cultivate it, they take an interest in it, and are loathe to throw it all up at the bidding of their cangany. I believe in distributing vegetable seeds.

(10) Coolies prefer to meet, at some central place for their weekly supplies, as they can then depend on seeing their relations and friends. Boutiques on estates I think, generally lead to illicit sale of arrack, and perhaps for reception of stolen produce.

(11) Liquor shops in the neighbourhood of estates are a perfect curse and generally mean at least ten per cent more loafers about estate lines, than there would otherwise be.

"LUNUGALLA."

NO. XXV.—HIGH DISTRICT.

(1) Every tea estate ought to have wire shoots leading to the factory wherever the lay of the laud is favourable. The damage they do to tea leaf is practically *nil*.

(2) Endless ropes, or aërial tramways, for uphill transport in the field, and all machinery in the factories are labour-saving appliances.

(3) On most upcountry estates, I should say the gradients are too steep for ground tramways, but wherever an easy gradient is obtainable they might be very useful.

(4) From long experience, my opinion is that weeding cannot be overdone, provided it is done carefully, with the minimum of scraping of the soil only allowed. Of course, it can be greatly overdone when heavy scrapers and mamoties are in use.

(5) I do not think any saving of labour can be effected by weeding less frequently, but just the reverse, as if the weeds were left for some months, one weeding would probably cost a great deal more than two or three monthly weedings. As to selected weeding, I am afraid it would be hopeless, as the extra supervision and trouble it would entail would be infinite. The weeders would most certainly leave obnoxious weeds, in the shape of grasses, &c., amongst the ferns and other selected weeds, which in time would lead to no end of trouble and expense. I have personally tried it and found it a failure.

(6) I have never tried any experiments in lupines, &c.

(7) If the estate is handweeded, or practically so, the present system of draining, on our steep hill sides, cannot well be improved upon, if the drains are close enough, say half-a-chain apart, and traced at proper gradients, say 1 in 12 to 1 in 16.

(8) The use of bullock and hand carts as much as possible.

(9) I think the coolies ought to be allowed more space for gardens &c. than they generally have at present. Some Superintendents, in my opinion, are very parsimonious in this direction. All coolies appreciate a good plot of ground however small, and at present I fancy not more than 20 % of our labour force have anything of the sort. Those who have not, very often feel the want of this convenience and have to go to the villages, and other places, to buy vegetables &c. instead of having a supply at their doors.

(10) In some districts bazaars are plentiful and in others they are insufficient, but it is almost impossible to get coolies to take their supplies from any one place. They will go miles to get their currystuffs at a fraction less cost than they could get the same articles on, or near to, the estate for an insignificant extra cost.

(11) Not much trouble about liquor shops in this district, but there is no doubt the fewer there are the better, although I think it would scarcely do to abolish them altogether. G.J.R.

No. XXVI.—Low District.

(1) Wire shoots are in use for firewood and leaf on many estates, but the formation of the land and situation of the factories render them impracticable on many others.

(2) There is no work so hard on coolies or which disgusts them so much as carrying chests of tea. Light narrow hand carts would obviate this very much and ought to be in more general use than they are.

(3) On the majority of estates, no practicable, would pay on very few.

(4) No, but often underdone.

(5) There ought to be little weeding. Clean the land thoroughly to begin with and never allow weeds to get to a length that the soil would be disturbed by taking them out. Mosses should never be disturbed —they grow in wet seasons—and go off when heat and drought set in having served a good purpose while they lasted.

(6) No, nor do I believe it would be advisable in Ceylon where our lands are so steep even though we had the labour, nor do I believe it would return the cost.

(7) The present system, I believe, is as good as we could get but the distance between the drains is often too great; with 16 to 19 chains drains to the acre according to soil and lay of land, there won't be much wash.

(8) Hand carts for transport of tea, lead, building materials, everything, where practicable will save 30 per cent to 40 per cent in cost and be much easier for the coolies.

(9) Certainly give coolies plenty of garden space; it makes them more at home, and if they barter a pumpkin or a few sweet potatoes for a coconut at the cadies, why not? In the low country it is a wise thing to dot the estate over with jak trees—they will begin to bear at 6 years. Set apart a division for each set of lines to get the fruit and lease out the balance—the Sinhalese will readily take it up.— Estates with plenty of jak trees will never be short of coolies.

(11) Liquor shops—especially illicit—are unmitigated evils in every district and Government Agents and Police Superintendents are powerless to suppress them,—though the places are pointed out to them. They are above detective work themselves; the supposed detectives they send are well entertained and bribed and report "nothing wrong."

W.M.U.

PICKINGS.

INDIAN INK, says the *Indian Forester*, is made in China as follows:—

SESAMUM (GINGELLY) OR COLZA OIL

or oil extracted from the seeds of *Dryandra Cordate*, varnish and pork fat. The lampblack got by burning these is mixed with glue and made into a paste which is beaten on wooden anvils with steel hammers. Generally some musk or camphor is added for the odour, and gold leaves to give a metallic lustre. Two good hammers can prepare 80 pieces each weighing half a pound. The price varies from 2s or less per lb. to as much as £7 per lb., there being over a dozen different grades. In 1895, about two tons of Indian ink were exported to foreign countries from Shanghai valued at £564, but the best part of the manufactured ink (and the best qualities) are used in China and not exported.

According to the *Agricultural Gazette* of N. S. Wales, "Experiments with

RHEA

have shown that this fibre plant will thrive to perfection in the loose, well-drained, sandy loams of our Northern river districts." The Government is anxious to encourage the cultivation of the crop on a commercial scale and intends offering a special prize for quantities of the product suitable for export. It is said that numbers of farmers have already arranged to put small areas under Rhea this year.

CEYLON TEA IN AMERICA AND ON THE CONTINENT OF EUROPE.—The "Thirty Committee" have resolved that the Tea Advertising Campaign must be vigorously pressed in America for another year, at least: £12,000 have accordingly been voted for Mr. Wm. Mackenzie to spend during 1898, and attention is to be given to the Western States. For Russia £2,000 have been voted; but we were not told who are to be the Advertising Agents. For the rest of Europe, but more particularly Austria and Hungary, the great tea house of Messrs. Cooper, Cooper & Co., are to be assisted in advertising. What will "Horniman's" and other rival houses say to this? However, the work of advertising is to go on merrily and that much good may come of it must be the earnest wish of all in Ceylon. We only hope the Indian Tea estate proprietors will do their duty as fully as their Ceylon brethren. If Ceylon expends £12,000 in America, India ought to lay out £16,000 to £18,000; and in same proportion in Russia, &c. If further warning as to the need is required, we would just point to the latest deliverance of the *Investors' Guardian* quoted on page 283 *et seq.*

TEA IN CALCUTTA; FACTORY BULKING.

(From *William Moran & Co.'s Market Report.*)

Calcutta, Sept. 1.

FACTORY BULKING.—In a circular dated 23rd August just issued by the Indian Tea Association, the proceedings are reported of a meeting held in *London*, attended by most of the influential men of the *Indian* and *Ceylon* Tea Trade. Mr. Peek, the Chairman of the Dealers' Association, said: "The Trade would like to know *where* the Tea was bulked, but they *preferred bulking in the Factory*, because Tea got *injured by being bulked in London.*" He further stated with regard to Teas not bulked on the Factory: "That what professed to be a sample of the bulk in some instances, was not what it purported to be, the result being, that the Trade not only had parcels of Tea thrown up by their customers, but often lost an account in consequence." In the face of this very decided opinion in favour of Bulking on the factory, we invite Agents and Managers to give it their attention, no chance should be lost to give Indian Tea every advantage in our power, to further its popularity with the consumer. Owing to the heavy arrivals of our Crop, during the rainy months in London, and the present system which prevails of bulking all Teas, exposure to the damp atmosphere is unavoidable, even under the most careful superintendence, as the bulking rooms, by the Fire Insurance rules, cannot be artificially heated and many fine parcels suffer in consequence and lose their flavour. If Factory bulking can be made really reliable, we think, it will prove a great boon to the Trade.

TEA PLANTING IN ANNAM.

A French paper states that after a long series of efforts and attempts which have been pursued with indomitable patience two Frenchmen have at last succeeded in giving to Annam a new industry in tea planting. It was in 1780 that the first attempt took place without any result; but in 1855 a French missionary residing at Phu-Thuong succeeded with a great deal of energy in getting some tea plantations started, but he was obliged to return to France, and thus the result of his energy was for a time dormant. Another missionary, after the insurrection of 1885, succeeded to some extent in making the population understand the value of tea planting. From that time all the neighbouring villages vied with each other to such an extent that now all the hillocks of Tung-Sen, Kien-Kien, Phu-Hoa, &c., are covered with tea, where formerly nothing but unhealthy shrubs were growing. Subsequently some French merchants came, they rented a few plots, and undertook to propagate by example in practising on their own plantations a well understood pruning, thus making the plants strong and healthy. A mission was sent to China, another to Java and Ceylon. A temporary factory was created in 1895, and today the cause has been so well fought that all the district of Phu-Thuong is devoted to the methodical culture of tea. A large brick and stone factory was constructed at Phu-Thuong at the beginning of this year, where the tea leaves are prepared as at Java and Ceylon, but without the addition of the perfume to which the Chinese have accustomed the Europeans.—*L. and C. Express*, Aug. 27.

PAPAW-JUICE.

A 30lb-case of the concrete juice of the papaw (*Carica Papaya*), shipped from Ceylon, was included in the drug-sales recently. It consisted of small irregular masses of a light brown colour, having an odour somewhat resembling that of Para-rubber. Papaw-juice is obtained by scarification from the unripe fruits, and is generally employed medicinally in countries where the tree is found. The active principle papain is readily precipitated by the auction of alcohol. Many virtues are attributed to papaw-juice; it is said to have the property of rendering tough meat tender, is used in the treatment of dyspepsia, diphtheria and as an anthelmintic, and is also recommended or eczema. The lot in question was sold at 5s per lb., "subject to approval."—*Chemist and Druggist*, Aug. 28.

TEA SHARES AS AN INVESTMENT: INDIA AND CEYLON.

In our recent article we tabulated the net revenue receipts for 1896 of nearly one hundred tea-producing Companies of India and Ceylon. These statistics showed that 57 Indian Companies, with an aggregate paid-up capital of £4,730,523, last year earned a net profit of £447,197, equal to 9·45 per cent. and 37 Ceylon Companies, with a capital of £2,531,112, made £272,229, equal to 10·75 per cent. Together, the ninety-four Companies with a paid up share capital of £7,261,635, made £719,426 in net profits, equal to 9·90 per cent. all round. These figures, we remarked at the time, pointed to tea-growing as a very remunerative undertaking, and it being, in our opinion, a sound and well-established industry, we unhesitatingly commended the debenture and preference shares generally as affording opportunities for safe investment. We added, however, that there were circumstances affecting the future of the trade which needed to be carefully considered in estimating the value of the ordinary shares as a permanent investment. The consideration of these circumstances is the purpose of the present article.

The immediate danger which threatens the tea trade is that of over-production, with all its associated evils. Hitherto India and Ceylon planters have had a competitive market in which to place their increased outturn, but that market has now been won and fully supplied. The British market has shown tremendous elasticity in the past for the teas of India and Ceylon, but it has been very greatly at the expense of those of Chinese growth. China is now almost completely beaten out of competition, therefore the expansion of the home market for tea in the future must depend upon additional consumption per head, and the natural increase in the population. It is improbable that these possible sources of increased demand will be sufficient to take the increase in the crop which would result merely from improved cultivation of the old gardens, and it is altogether impossible that the British market can by any means take up the enormous increase in the out-turn which must result from the very large extensions which are being made. The trade therefore depends upon the opening up of new markets—in Europe, America, Australia, and South Africa. Each of these continents offers the possibilities for a large trade, but in many instances they are pioneer, not competitive markets. Speaking broadly, they are not already occupied by another variety of tea, with which the product of the Indian and Ceylon gardens has only to be brought into competition to win, hands down.

In considering the value of the ordinary shares of British tea companies, it is of primary importance to gauge what probability there is of British-grown tea finding acceptance in these new countries. A large increase in the out-turn in the immediate future may be taken for granted. If it needs to be substantiated, we have only to refer to the extensions of their old gardens which are being, or have recently been made, by nearly every company—in some cases very large extensions—and the new areas which are being brought into cultivation. We are informed by an old planter of many years experience, that had there been sufficient labour to have gathered the whole of the Ceylon crop of last year, the market would have been glutted. This shows how imminent the danger of over-production is. There is no doubt that when, in the course of years, the young plants which have been put in during the last year or two, come into full bearing the increase must be something enormous. It is quite unnecessary to labour the point of how disastrous must be the effect of this large increase on the price of tea, unless the demand of the new markets is commensurate with the increase of the out-turn.

What are the prospects of new markets? Take first America. The consumption of tea in the United States in 1890-92 was about eighty-two or eighty-three million lb.; in 1893 the imports were 88,000,000 lb.; in 1894,

91,800,000 lb.; in 1895, 96,500,000 lb.; and in 1896 over 100,000,000 lb. Canada imported in 1896 about 22,000,000 lb. These figures are unofficial, and too much reliance must not be placed upon them. The tea for American consumption, however, is supplied almost wholly from China and Japan. The consumption of British-grown tea, although increasing, is insignificant. According to Mr. Blechynden, the agent of the Indian Tea Association, Indian tea is displacing the China varieties in the American market. Although the capture of this market would be a valuable prize for the Indian tea industry, we do not think that it is in this displacement that British planters can look for relief from the threatened evils of over-production. The American consumption averages only 1½ lb. per head of the population, against 8 or 9 lb for the United Kingdom, and we note also that Mr. Blechynden, in his 1896 report, specially qualifies his statement regarding the displacement of China teas, by adding, parenthetically, "not Japan." This indicates that the energetic and enterprising Jap will prove a more formidable competitor than his neighbour, the Chinaman. We think, therefore, that the best chance for Indian and Ceylon tea lies in creating a demand of its own, not in attempting to take the market—and that a comparatively small one—from rival varieties. That would come later, in the natural course of things. British-grown tea is steadily making its way in the favour of our American cousins and Canadian brethren, as the following statistics, being the imports from 1890 to 1895, will show:—

1890 ..	2,364,152 lb.	1893 ..	4,211,075 lb.
1891 ..	2,635,772 ,,	1894 ..	5,379,542 ,,
1892 ..	3,208,655 ,,	1895 ..	9,283,144 ,,

1896 (U. S.) 9,474,019 lb.

This improvement continues, and Mr. Wm. McKenzie, the agent of the Ceylon Association, reports that the shipments of Ceylon and Indian teas for London to North America in January and February of this year amounted to 1,202,000lb. against 262,000lb. in the corresponding months of the previous year. There was also a much larger shipment direct from Colombo and Calcutta, although he adds that the apprehension that a duty might be put upon tea may partly account for the enormous increase. Notwithstanding this, it is estimated that during the present year the American market will take upwards of five or six million lb. more than in 1896. If this expectation be realised—and there is every indication that it will—the outlook for British-grown tea securing at least a fair proportion of the American market is very favourable. Still there is the Japanese competition to meet. Already the Japanese Government has voted a sum of about 245,000 dols. to be expended over a period of seven years in the United States for the purpose of pushing the sale of Japan teas.

Outside of the United Kingdom, Australia is the largest consumer of British-grown tea. The tea drinking of the Australians is a by-word among nations, and it is in this market that the grower of Indian and Ceylon has the best chance of expansion, for here again he comes into competition with the China tea, which he has already shown he can easily beat. The quantity of British-grown tea consumed in the Australias is steadily increasing, having risen from eight millions to sixteen million lb. in the years 1891-6. In the last season the direct export from India and Ceylon was 17¼ million lb. out of a total import into Australia of 28,000,000 lb. This represents a considerable displacement of the China variety.

The other great possible market is Europe, and here again the outlook is distinctly promising. Tea is coming more and more into favour in the countries of the Continent. In the short space of five years the consumption has increased in Russia and Germany from 1 to 4¾ millions lb.; in Turkey and Persia from 4¾ to 6½ millions. The French have not yet taken to it. In 1896 only 200,000 lb. was imported, although this is an increase of 100 per cent. in five years. In all these countries, however, there is promise of very considerable development.

In determining the value of tea shares, it is also necessary to consider several circumstances which are much in their favour. For the most part the Companies are not over-capitalised, and, in the second place, speaking generally, they are managed by practical business men of great experience either in tea planting, or in the tea market at home, or who are well versed in Indian and Ceylon administration. There are, perhaps, fewer "ornamental" directors in this industry than in any other of equal importance in the City. The trade is also a secure one—for tea is not a commodity which is at all likely to lose its hold on public favour.

With combined and energetic action on the part of British planters the new markets indicated above should furnish an appreciable outlet for the increased outturns. If growers do not find some such outlet the price of tea, which has already fallen 2d per lb. within the last few years, must fall still further.

Erratum.—In the statistical table in our previous article, the dividend on the ordinary or "C" shares of the new Dimbula Co. appeared as 6 per cent.; it should have been 14 per cent. The net profit of £20,323, on a capital of £86,200, made the mistake obvious.—*Investors' Guardian*, Aug. 21.

DEAFNESS. An essay describing a really genuine Cure for Deafness, Ringing in Ears &c., no matter how severe or long standing, will be sent post free.—Artificial Eardrums and similar appliances entirely superseded. Address THOMAS KEMPE, Victoria Chambers, 19, Southampton Buildings, Holborn, London.

DRUG REPORT.

(From *the Chemist and Druggist.*)

London, Sept. 9th.

Cinchona.—The auctions to be held in Amsterdam on September 30th will consist of 3,945 bags and 366 cases Java bark, details of which will be published next week. The stock in first hands now consists of 2,601 packages, exclusive of above quantity. The stock in second hands have also decreased by 1,500 packages. The exports of cinchona bark from Java during the period from July 1st to June 30th have been as follows:

	1896-7 Amst. lb.	1895-6 Amst. lb.	1894-5 Amst. lb.	1893-4 Amst. lb.
Private Plantations -	8,826,536	8,401,282	8,030,586	6,961,296
Government Plantations	615,255	707,103	674,471	467,040
	9,441,791	9,108,385	8,705,057	7,428,336

Cocaine.—It is reported that one continental manufacturer is offering Hydrochlorate at 8s 6d per oz., but we have not heard of any business at this figure. The makers of B. & S. brand do not seem to be offering, though the nominal quotation is from 9s to 9s 6d per oz. Seven packages crude have arrived, per the "Atrato," from Callao.

Cocoa-butter.—At auction on Wednesday 300 cases (30 tons), Cadbury's brand, sold at 11¾d to 11⅞d, the average being about 11 13-16th d. against 10⅞d per lb. in August. One hundred and fifty cases of Dutch were bought in at 10¾d per lb. At the Amsterdam auctions, held on September 7, 85,000 kilos (84 tons) Van Houten's brand were offered, and sold at prices ranging from 60c to 63c per kilo (equal to 1s to 1s 0½d); 30,000 kilos (29¾ tons) Hamer sold at 59c (equal to 11¾d). For 15,000 kilos (15 tons) Hollandsche 55c (11d) was bid, and refused; 7,600 kilos (7½ tons) Mignon were bought in, 59c (11¾d) being refused. Of 4,000 kilos (4 tons) Suchard's brand offered, 2,000 kilos sold at 58c the remainder being bought in. On the whole, the market was irregular.

Oils (Essential).—Citronella oil is steady, but unchanged, at 1s 2d to 1s 2½d per lb. on the spot for either drums or tins. Owing to the continued rise in cloves the English oil has been advanced 1d per lb., making list-price 2s 3d per lb. for opt., and 2s 1d per lb. for B quality, these prices being without engagement considering the strong position of the article. Lemongrass is firm at 2 11-16th d. to 2¾d per oz. c. i. f. terms.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

Colombo, Sept. 28th, 1897.

Exchange on London: Closing Rates. *Bank Selling Rates*:—On demand 1/3⅝; 4 months' sight 1/3 21-32; 6 months' sight 1/3 11 16. *Bank Buying Rates*:—Credits 3 months' sight 1/3 29-32; 6 months' sight 1/3 31-32. Docts 3 months sight 1/3 1-16; 6 months sight 1/4

Coffee.—Plantation Estate Parchment on the spot per bushel R14·25 Very scarce Estate Crops in Parchment, delivery per bus. no quotations. Plantation Estate Coffee, f.o.b. on the spot per cwt. R81·00 Very scarce. Liberian parchment on the spot per bushel, R5·00. Nominal Native Coffeeunpicked and undried per cwt. R62·00 do

Tea.—Average Prices ruling during the week Broken Pekoe, per lb. 48c. Pekoe per lb. 37c. Pekoe Souchong per lb. 28c. Broken mixed and Dust, per lb. 19c. Averages of Wednesday's sale.

Cinchona Bark.—Per unit of Sulphate of Quinine per lb 03½c. Very scarce

Cardamoms.—per lb R2·50 Rs.2·75 for special qualities

Coconut Oil.—Mill oil per cwt. R13·50. Dealers' oil per cwt. R13·25 Coconut oil in ordinary packages f.o.b. per ton R302 50.

Copra.—Per candy of 560 lb. R39·00

Coconut Cake: (Poonac) f.o.b. (Mill) per ton, 90·00

Cocoa unpicked and undried, per cwt. R38 Nominal

Coir Yarn.—Nos. 1 to 8 { Kogalla R18·00 / Colombo R16·50

Cinnamon.—Nos. 1 & 2 only f.o.b. 62c.
Do Ordinary Assortment, per lb 56½c.

Ebony.—per ton None

Plumbago:—Large Lumps per ton, R350
Ordinary Lumps per ton, R340
Chips per ton, R190. Dust per ton, R140 00

Rice.—Soolye per bushel, { R410·00 to 4·20 }
,, per bag, { R10·25 to 11·50 }
Pegu and Calcutta Calunda R10·00 to 11·25
Coast Calunda per bushel, R4·15 to 4·50
Muttusamba per bushel, R4·15 to R4·65
Kara per bushel,
Rangoon Raw 3 bushel bag —

FREIGHTS.

Cargo.	Per ton London per str. s. d.	N. York per str. s. d.	Trieste per str. s. d.	Mar'lles per str. R. c.	Hamb', Bremen &c. s. d.
Tea	20/	25/	20/	25·00	15/
Coconut Oil	..	25/	17/6		15/
Plumbago	15/	20/	17/6		15/
Coconuts in bags	15/	..	17/6		15/
Other Cargo	15/	22/6	17/6		20/
Broken Stowage	10/	..	..	..	..
SAILERS.					
Coconut Oil	..	25/		..	..
Plumbago	..	25/	..	..	..

LOCAL MARKET.

(By Mr. A. M. Chittambalam, Baillie St., Fort)

Colombo, Sept 30th, 1897.

Estate Parchment per bushel R17·75 to 14·25
Chetty do do do R13·00 to 13·50
Native Coffee unpicked per cwt R48·00 to 50·00
do F.O.B. per cwt. R56·00 to 58·00 nominal
Liberian coffee per bushel R6·00 to 7·00
do clean coffee per cwt nominal R40·00 to 42·00
Cardamoms per lb. R1·50 to 2·25 little doing
Cocoa unpicked per cwt. R28·00 to 32·00
do picked do R35.00 to 41·00
Rice Market steady.
Sooly Scarce per bag R10·50 to 11·00 nominal
Callunda S arce
Coast Callunda 4·12 to 4·20 per bushel
do Kara 4 06 to 4·18 do
Muttusumba 4.18 to 4·40 do
Cinnamom per Nos 1 to 4 55c.
do do 1 & 2 60c.
do Chips per candy R80·00
Coconuts Ordinary per 1000 R30·00 to 34 0
do Selected do R38·00 to 40·
Coconut Oil per cwt. R13·25 to 13·50
do per ton F. O. B. R300 to 302·50
Copra per Candy.—}
Kalpitiya do R39·50 to 40·00
Marawila do ,, 37·00 to 38·50

Cart copra do ,, 33·00 to 36·00
Poonac Gingelly per ton R85·00 to 87·50
do Chekku do ,, 85·00 to 90
Mill (retail) do ,, 80·00 to 85·00
Cooton seed do ,, 80·00
Satinwood R1·75 to 2·25 cubic feet
Halmilla R1 to 1·50
Ebony per ton R 100 o 185
Kitul Fibre per cwt. ,, 30·00 to 32·00
Palmyra Fibre:—
Jaffna Black clean per cwt. R19·00 to 20·00
do Mixed do ,, 16·00 to 17·00
Indian do do ,, 10·00 to 14·00
do Cleaned Nil
Sapan wood per ton R55·00 to 60·00
Kerosine Oil American per case R7·31 to 7·37
do Bulk Russian tin R2 68 to 2·73
do Russian in Case ,, 5·45 to 5 50
Kapok Cleaned f o b per cwt. R27·00 to 29·00
do Uncleaned do ,, 6·00 to 7·00
Croton Seed per dwt no business, R25·00 to 40·00
Nux Vomica per cwt R4·00 to 5·00 nominal

Plumbago per ton, according to quality	Large lumps	R250 to 350
	Ordinary ,,	R220 to 340
	Chips	R100 to 200
	Dust	R 60 to 120

CEYLON EXPORTS AND DISTRIBUTION.

1896-97.

COUNTRIES.	Coffee cwt Plantation	Coffee cwt N'tive	Coffee cwt Total.	Cinchona. 1897 B'nch & Trunk lb	Tea. 1897 lb.	Tea. 1896 lb.	Cocoa cwt.	C'moms lb.	Cinnamon Bales lb.	Cinnamon Chips lb.	Coconut Oil 1897 cwt.	Coconut Oil 1896 cwt.	P'bago 1897 cwt.
To United Kingdom	11207	..	11207	230887	75302106	69442510	22500	195788	721058	193858	54258	57030	116564
,, Austria	247	2	249	..	14360	29454	..	..	7600	29400	5163	17003	..
,, Belgium	..	1	1	..	9470	30695	86	..	55900	66248	909	2328	26700
,, France	600	..	600	..	59403	44792	232	...	45900	16160	..	114	307
,, Germany . ..	216	..	216	4132	189503	75721	271	29330	486600	305984	5147	8027	51830
,, Holland ..	58	.	58	..	15305	3889	..	..	..	..	..	400	891
,, Italy . ..	..	.	..	3132	5071	7257	..	..	116300	72452	269	1410	41
,, Russia	..	..	..	..	324612	224012	..	..	..	..	299	81	..
,, Spain	..	..	..	..	21570	39010	..	..	174760	9240	..	208	..
,, Sweden	250	..	250	..	35123	4925	..	..	..	..	303	402	306
,, Turkey	..	..	..	..	7280	14905	...	..	..	..	...	..	..
,, India	54	..	54	...	729793	693332	5	140503	61	...	119014	56997	342
,, Australia	3711	212	3923	..	9205561	7891692	60	25	4010	29896	2099	1830	630
,, America	..	..	...	263142	569708	439216	47	..	79828	10000	39587	37444	51291
,, Africa	10	..	10	..	174685	75386	..	187	..	..	10	4	..
,, China	50	.	50	29353	469468	218652	..	..	20000	..	266	4277	369
,, Singapore	..	35	35	..	22601	55545	599	200	..	..	32282	29081	.
,, Mauritius	..	..	..	..	11790	91790	..	..	..	..	..	..	..
,, Malta	..	..	..	..	45910	113050	..	..	..	..	..	..	..
Total exports from 1st Jan. o 21st Sept. 1897	16403	250	16653	530646	87213319		23800	366033	1712017	733238	259546		249271
do 1896	18355	645	19000	881743	79495833		25586	243177	1442253	568992	216636		253925
do 1895	54293	3707	58000	803834	74670751		23006	260255	1550562	491048	242653		205211
do 1894	22892	588	23480	2219618	64940455		16111	212462	1372163	389732	348749		244829

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Prices Current, London, September 8th, 1897.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	44s a 120s
Zanzibar & Hepatic ,,	Common to good ..	13s a 76s
BEES' WAX, ,,		
Zanzibar & { White ,,	Good to fine ...	£7 a £8
Bombay { Yellow ,,	Fair ..	£5 12/6 a £5 17/6
Madagascar ,,	Dark to good palish ..	£5 15s a £6 2/6
CAMPHOR, China ,,	Fair average quality ...	92s 6d
Japan ,,	,, ,, ,,	102s 6d
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	3s a 3s 1d
	Middling, stalky & lean	2s 6d a 2s 9d
Ceylon.—Mysore ,,	Fair to fine plump ..	2s 6d a 3s 9d
	Seeds ...	2s 6d a 3s 1d
,, Tellicherry ,,	Good to fine ...	2s 9d a 3s
	Brownish ..	2s 6d
,, Long ,,	Shelly to good ..	2s a 2s 9d
,, Mangalore ,,	Med brown to good bold	3s 3d a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	3½d a 4½d
Madras ,,	..	[illegible]½d
CHILLIES, Zanzibar cwt.	Dull to fine bright .	30s a 40s
CINCHONA BARK.—		
Ceylon lb.	Ledgeriana Chips ..	2d a 5d
	Crown, Renewed ..	2d a 4½d
	Org. Stem	1¼d a 3⅛d
	Hybrid Root ..	2¼d a 2½d
	Chip ..	1¼d a 2d
CINNAMON, Ceylon 1sts	Ordinary to fine quill..	10½d a 1s 6d
per lb. 2nds	,, ,, ..	10d a 1s 5d
3rds	,, ,, ..	9½d a 1s 3d
4ths	,, ,, .	8½d a 1s
Chips	,, ,, .	[illegible]½d a 3d
CLOVES, Penang lb.	Dull to fine bright bold	4¼d a 9½d
Amboyna ..	Dull to fine ..	3d a 4½d
Zanzibar }	Good and fine bright	2⅝d a 2¾d
and Pemba }	Common dull to fair .	2⅜d a 2 9-16d
Stems ..	Fair .	1d
COCULUS INDICUS cwt.	Fair ..	8s 6d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	110s a 116s
	Middling to fine mid .	103s a 108s 6d
	Low mid. and low grown	97s 6d a 101s
	Smalls ..	86s a 98s
Native ,,	Good ordinary ...	65s a 89s 6d
Liberian ,,	Small to bold ..	38s a 50s
COCOA, Ceylon ,,	Bold to fine bold ..	70s a 80s
	Medium and fair ..	64s a 68s 6d
	Triage to ordinary ..	45s a 55s
COLOMBO ROOT ,,	Fair to good ..	20s a 30s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair .	£10 a £16
FIBRE, Brush ,,	Ord. to fine long straight	£10 a £21
Cochin ,,	Ordinary to good clean	£15 a £21
Stuffing ,,	Common to fine ..	£5 a £6 10s
COIR YARN, Ceylon ,,	Common to superior	£12 a £26 10s
Cochin ,,	,, ,, very fine ..	£12 a £34
do. ,,	Roping, fair to good ..	£10 10s a £13
CROTON SEEDS, sift. cwt.	Dull to fair ...	50s a 60s
CUTCH ,, ,,	Fair to fine dry ..	9s 3d a 32s 6d
GINGER, Bengal, rough ,,	Fair ..	16s
Calicut, Cut A ,,	Good to fine bold ..	70s a 80s
B & C ,,	Small and medium ..	30s a 68s 6d
Cochin Rough ,,	Common to fine bold .	23s a 50s
	Small and D's ..	10s a 27s 6d
Japan ,,	Unsplit ...	13s a 13s 6d
GUM AMMONIACUM ,,	Sm. blocky to fine clean	30s a 56s
ANIMI, Zanzibar ,	Picked fine pale in sorts	£10 7s 6d a £13
	Part yellow and mixed	£7 17/6 a £10 10s
	Bean and Pea size ditto	70s a £7 12/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 137s 6d
Madagascar ,,	Fair to good palish ..	£4 8s a £8
	,, ,, red .	£4 5s a £9
ARABIC E.I. & Aden ,,	Ordinary to good pale	40s a 62s 6d
Turkey sorts ,,		56s a 85s
Ghatti ,,	Pickings to fine pale ...	20s a 55s
Kurrachee ,,	Good and fine pale ...	52s 6d a 65s
	Reddish to pale selected	35s a 45s
Madras ,,	Dark to fine pale ..	35s a 40s
ASSAFŒTIDA ,,	Clean fr to gd. almonds	40s a 80s
	Ord. stony and blocky	30s a 37s
KINO ,,	Fine bright ..	£45 a £55
MYRRH, picked ,,	Fair to fine pale ...	70s a 82s 6d
Aden sorts ,,	Middling to good ...	33s a 57s 6d
OLIBANUM, drop ,,	Good to fine white ...	34s a 60s
	Middling to fair ..	20s a 31s
pickings ,,	Low to good pale ...	11s a 12s 6d
siftings ,,	Slightly foul to fine ...	9s 6d a 14s
INDIARUBBER, Assam lb	Good to fine ...	1s 9d a 2s 4d
	Common to foul & mxd.	3d a 1s 6d
Rangoon ,,	Fair to good clean ...	1s 4d a 2s 2d
Borneo ,,	Common to fine ..	1s 2d a 1s 9d

	QUALITY.	QUOTATIONS
INDIARUBBER, (Contd).		
Java, Sing. & Penang lb.	Foul to good clean ..	1s a 2s 3d
	Good to fine Ball ..	2s 3d a 2s 7½d
	Ordinary to fair Ball...	1s 2d a 2s 2d
Mozambique ,,	Low sandy Ball ..	10d a 1s 1d
	Sausage, fair to good .	1s 9d a 2s 7½d
	Liver and livery Ball...	1s 4d a 2s 3d
	Fr. to fine pinky & white	1s 11d a 2s 5d
Madagascar ,,	Fair to good black ...	1s 6d a 1s 10d
	Niggers, low to good..	1s a 1s 5d
INDIGO, E.I. ,,	Bengal--	
	Shipping mid to gd violet	4s 4d a 5s 1d
	Consuming mid. to gd.	3s 4d a 5s
	Ordinary to mid. good	2s 10d a 3s 3d
	Mid. to good Kurpah..	2s a 3s 6d
	Low to ordinary ...	1s 3d a 1s 11d
	Mid. to good Madras...	1s 1d a 2s 3d
MACE, Bombay & Penang	Pale reddish to fine ..	1s 10d a 2s 9d
per lb.	Ordinary to fair ..	1s 6d a 1s 9d
	Pickings	1s 3½d a 1s 4d
MYRABOLANES, } cwt.	Dark to fine pale UG...	3s 9d a 5s 6d
Madras }	Fair Coast .	4s 6d
Bombay ,,	Jubblepore ...	4s a 7s
	Bhimlies ..	4s 3d a 9s
	Rhajpore, &c. ..	3s 9d a 7s
Bengal ,,	Calcutta ..	3s 6d a 5s 6d
NUTMEGS— lb.	64's to 57's ..	3s a 3s 2d
Bombay & Penang ,,	110's to 65's ..	1s 3d a 2s 9d
	160's to 130's .	8d a 1s 1d
NUTS, ARECA cwt.	Ordinary to fair fresh...	12s a 14s
NUX VOMICA, Bombay	Ordinary to middling..	4s a 6s 6d
per cwt. Madras	Fair to good bold fresh	7s a 7s 6d
	Small ordinary and fair	6s 6d
OIL OF ANISEED lb	Fair merchantable ..	5s 3d
CASSIA ,,	According to analysis..	5s a 7s 6d
LEMONGRASS ,,	Good flavour & colour..	2⅜d
NUTMEG ,,	Dingy to white ..	3¼d a 4d
CINNAMON ,,	Ordinary to fair sweet..	4d a 1s 7d
CITRONELLE ,,	Bright & good flavour	1s 1½d a 1s 2d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody..	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ...	10s a 15s
	,, wiry Mozambique	10s a 11s
PEPPER - (Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ..	3⅛d a 3 5-16d
Singapore .	Fair	3⅜d a 3 7-16d
Acheen & W. C. Penang	Dull to fine	2⅝d a 3⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	15s a 17s 6d
	Middling to good small	3s 6d a 13s
chips ,,	Dull to fine bright	1s 6d a 8s 9d
dust ,,	Ordinary to fine bright	2s a 6s
SAFFLOWER ,,	Good to fine pinky ..	80s a 85s
	Middling to fair ..	60s a 70s
	Inferior and pickings ..	50s a 55s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour .	£20 a £35
Chips ,,	... ...	5s a £3
Madras. Logs ,,	Fair to good flavour ..	£30 a £50
Chips ,,	Inferior to fine ..	£4 a £8
SAPANWOOD Bombay ,,	Lean to good ...	£4 a £5
Madras ,,	Good average ...	£4 a £5 nom.
Manila ,,	Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth..	£6 a £7
SEEDLAC cwt.	Ord. dusty to gd. soluble	70s a 80s
SENNA, Tinnevelly lb	Good to fine bold green	4d a 7d
	Fair middling medium	2¼d a 4½d
	Common dark and small	1d a 2d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's	£5 7/6 a £5 12/6
	D's and B's	£4 7/6 a £5 12/6
	Small	£3 17/6 a £4 7/6
Mussel ,,	Small to bold ...	20s a 55s
TAMARINDS, Calcutta..	Mid. to fine bl'k not stony	7s a 8s 6d
per cwt. Madras	Stony and inferior ..	4s a 6s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	18s a 25s
TURMERIC, Bengal cwt.	Fair	10s a 10s 6d
Madras ,,	Finger fair to fine bold	16s a 17s
Do. ,,	Mixed midlng. [bright	12s a 13s
Do. ,,	Bulbs	12s
Cochin ,,	Finger	12s 6d
	Bulbs	7s 3d
VANILLOES— lb.		
Mauritius and } 1sts	Gd. crysallized 3½ a 9 in.	22s a 30s
Bourbon ... } 2nds	Foxy & reddish 4½ a 8 ,,	17s a 26s 6d
Seychelles 3rds	Lean and inferior ..	12s a 16s
VERMILION lb.	Fine, pure, bright ...	2s 2d
WAX, Japan, squares cwt.	Good white hard ...	41s

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for October :—

Vol. IX.] OCTOBER, 1897. [No. 4.

SEASON REPORTS.

WESTERN *Province.*—Paddy. Yala harvest has begun; the excessive rains have to some extent damaged the crop.

Central Province.—Paddy. Yala crop being harvested in Kandy and Matale district. Rainfall registered at Matale 10·77 in.

Northern Province.—Paddy. Ploughing and manuring going on in Jaffna for next year's Kalapokam. Rainfall at Jaffna 5·41 in. Threshing of Kalapokam going on in Mannar as well as manuring of fields and tobacco gardens.

Southern Province.—Paddy. Yala harvest over, and yield fair; good crop under Walawe channels. Preparations for Maha cultivation begun.

Eastern Province.—Paddy. Pinmari cultivation over 8,000 acres in good condition and ear. Murrain in some parts of Batticaloa South.

North-Western Province.—Paddy. Prospects of Yala crop good. Murrain in the Three Korales. Rainfall at Puttalam 2·11 in.

Province of Uva—Paddy. Maha harvest still going on. Health of cattle good.

Province of Sabaragamuwa.—Paddy. Yala harvest in progress; prospects good. No cattle murrain reported.

North-Central Province—Paddy. Crop maturing and being reaped, prospects good on the whole. Rainfall at Anuradhapura 1·83 in.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF SEPTEMBER, 1897.

1	Wednesday ..	Nil	17	Friday ..	Nil
2	Thursday ..	·42	18	Saturday ..	·75
3	Friday ..	·59	19	Sunday ..	·95
4	Saturday ..	·07	20	Monday ..	Nil
5	Sunday ..	·19	21	Tuesday ..	Nil
6	Monday ..	·05	22	Wednesday ..	Nil
7	Tuesday ..	·30	23	Thursday ..	·11
8	Wednesday ..	·09	24	Friday ..	Nil
9	Thursday ..	·13	25	Saturday ..	Nil
10	Friday ..	Nil	26	Sunday ..	·14
11	Saturday ..	·80	27	Monday ..	·43
12	Sunday ..	·85	28	Tuesday ..	Nil
13	Monday ...	Nil	29	Wednesday ..	·11
14	Tuesday ..	Nil	30	Thursday ..	Nil
15	Wednesday ..	·12	1	Friday ..	·30
16	Thursday ..	Nil			

Total.. 6·32
Mean.. ·21

Greatest amount of rainfall in any 24 hours on the 19th, Sunday, ·95 inches

Recorded by A. R. JEREMIAH.

TREATMENT OF SUCKERS ON CACAO IN CEYLON AND THE WEST INDIES.

We are accustomed in text-books whether treating of agriculture or any other industrial pursuit to find certain hard and fast rules laid down for the guidance of the student,— rules, no doubt, founded on correct principles; but it would be the height of absurdity for the young agriculturist to stick by his text-book rules and regulations, and, irrespective of any modifying

circumstances, refuse to depart one hair's breath from their teaching. This would be as bad as the case of the enthusiastic novice who sallied into the field armed with a tome which he ever consulted before issuing instructions to labourers, regardless of the character of soil, rainfall, and other modifying conditions.

Many of our readers may have seen the text-book on *Tropical Agriculture* by Dr. Nicholls, a work which the Jamaica Government considered to be the best of those which were written in competition for a premium offered by it. In the end the work was published by the Government of Jamaica, it received the *imprimatur* of so high an authority as Dr. Morris, and was highly commended by the West Indian press. Dr. Nicholls states that his hope—expressed in his Preface to the first edition—that the book will prove serviceable to peasant proprietors, owners of estates, and intending settlers in tropical countries, is likely to be realized, while the fact that his work is being used in the colleges and higher schools in the West Indies is further testimony to the value which is attached to it. Dr. Nicholls himself accounts for the success of his *Tropical Agriculture* by stating that it "is due probably to the fact that it is not a mere compilation but the record of experience that has been gained by study, observation and experimental cultivation." So that it would appear that all West Indian authorities (including the good doctor himself) have accepted the book referred to as a standard work on the subject of which it treats.

Now the West Indies, where Dr. Nicholls has gained all his agricultural training and experience, is the home of cacao, and therefore may we expect to have sound advice as to the methods involved in the cultivation of the plant. We are, however, at present only concerned with the treatment of Suckers, and will therefore quote from *Tropical Agriculture* on this point.

In his chapter on Pruning, Dr. Nicholls thus refers to the treatment of suckers, no doubt speaking generally: "In all cases, however, suckers or robber stems, as they are called, must be removed from trees or bushes grown for their crops, as suckers rob the plant of much of the sap or food necessary for the growth of the flowers or fruit."

But again writing under Pruning—but referring specially to cocoa—he says: "The cacao planter will have to give careful attention to the pruning of the trees if he wishes to get large crops. As the pods are borne on the larger branches the principle is to develope such branches by judicious pruning and to see that they are not covered up by a mass of foliage and small twigs. A typical cacao tree should have one stem giving off at a few feet from the ground three to five branches which spread in an open manner and are free from leaves except at the tops—thus the leaves shade the open interior portion without interfering with a free circulation of air. If the young plants throw out more than one main stem, the surplus ones must be pruned off; and after the lateral branches are formed, no upward prolongation of the stem must be allowed to grow. If the tree be left alone, these upward branches will come off from the stem just below the laterals in the form of suckers, and to leave them on is to cause the strength to be taken off from these fruitful laterals as well as to allow the tree to run up, perhaps, for thirty feet or more, thereby causing much trouble in picking the pods. When the suckers are pruned off fresh ones will grow after a short time, so that the trees will require frequent attention until they are mature, when the tendency to throw out suckers will be stopped.

Among cocoa planters in Ceylon there may be said to have been two schools,—those who believed in pruning, and particularly suckering, and those who did not. The merits of the system of culture which each school practised were sought to be gauged by the bulk of crop which resulted in each case, and it is still perhaps a debateable point which gave the larger produce. But of late there has been a new and unexpected solution to the differences of opinion as regards the treatment of suckers, worked out by the unfortunate malady, affecting cacao trees in certan districts, called by experts "the cacao canker." We will not weary our readers by summarising the large mass of correspondence on the subject of this disease in cacao and its relation to the treatment of the suckers on the trees, but suffice it to say that the tendency on the part of those who had studied the subject and took part in the discussion has been to condemn such a mode of treatment as that which Dr. Nicholls advices in his *Tropical Agriculture* from which we have quoted. We do not believe that any one who has been moving about the cacao districts and comparing the condition of the two types of estates representing the two schools of cacao planters, will persist in the treatment which favours pruning and suckering. The question which remains to be solved is "what reason can be assigned for the failure in Ceylon of a system of treatment which is considered to suit the cocoa plant in the West Indies"?

OCCASIONAL NOTES.

We have to acknowledge with thanks receipt of the first two Circulars or Bulletins issued by the Director of the Royal Botanic Gardens, Peradeniya, and we have no doubt, to judge from the character of these two, that the Circulars will prove of inestimable value to all who are interested directly or indirectly in the cultural industries of the Colony.

We are glad to be able to state that through a kind concession granted by the General Manager of Railways it will be possible for the students of the School of Agriculture to be taken on periodical tours in connection with their work.

In India the occurrence of serious or epidemic disease among cattle has to be reported direct, and if necessary by telegram to the Veterinary Department. This is a plan that should be followed in Ceylon, as in many cases outbreaks of cattle murrain are found to have died out before the arrival of veterinary aid.

Mr. J. F. Bailey writing about the Papaw (*Carica papaya*) gives some interesting information about this familiar tropical fruit, in the last *Queensland Agricultural Journal*. The generic name is said to have been given to it

on account of the foliage somewhat resembling that of the common fig (*Ficus carica*); while Rumphius suspected that it was originally brought from a district called Popaya in Peru, and hence that name came to be applied to it.

The Papaw Juice—which is now quoted at 5s. per lb.—is easily prepared. The unripe fruit has to be scarred or lined some ¼ in. deep, with a sharp knife daily, and the juice caught and dried upon sheets of glass, when it becomes at once a marketable commodity. The active principle, papain, is in much esteem as a medicinal agent. The *Chemist and Druggist* gives the following method of preparing it:—"The juice is pressed out of the fruit, clarified by filtration through a twill bag, and the ferment precipitated by alcohol. It is then dried but is sometimes purified by treatment with water."

The subject of rainfall has been much before the public of late, no doubt due to the furnishing of departmental rainfall returns and to the occurrence of some unusually heavy falls in the country In this connection the following quotation will be found interesting: "Many local circumstances may affect the quantity of rain which falls in different countries; but, other things being equal, most rain falls in hot climates, for there the vaporisation is most abundant. The rainfall decreases in fact from the equator to the poles. At London it is 23·5 in.; at Bordeaux it is 25·8; at Madeira 27·7; Havannah 91·2.; and at St. Domingo 107·6. The quantity varies with the season: In Paris, in winter, it is 4·2 in.; in spring 6·9; in summer 6·3; in autumn 4·8 inches. The heaviest rainfall at any place on the globe is on the Khasia Hills in Bengal, where it is 600 in., of which 500 in. fall in, seven months. The driest recorded place in England is Lincoln, where the mean rainfall is 20 in., and the wettest is Stye in Cumberland where it amounts to 165 in." This was written in 1877, and it would be interesting to know what changes have taken place since then.

THE KAPOK TREE.

This tree, botanically known as *Eriodendron anfractuosum*, the floss from which is commonly known among the natives of Ceylon as "pulun," is the subject of a notice in the *Imperial Institute Journal*.

In the course of a description of the various uses of the tree, we find it stated that "the seeds are sometimes eaten; they yield a bland fatty oil, the residual cake being used as a cattle food." Such a statement would more correctly apply to the seeds of the true cotton (*Gossyppium*), for to say that the cake or poonac is used as cattle food would convey the idea that such use is general or even common, while on the contrary it must be rare. Dr. Watt himself does not write very definitely regarding the uses to which the seeds are put. He says:—"The seeds are said to be eaten.........the seed cake is sometimes given as fodder." As regards Ceylon, it may be said that the seeds are used as food neither for man or beast.

Some time ago we were consulted as to the desirability of using the seeds of kapok for manurial purposes. The inquiry came from a large dealer in the "silk cotton," who having to deliver the cotton clean naturally had large quantities of the seed on his hands. The following is a comparative analysis of the cake of Kapok and cotton.

	Kapok.	Cotton.
Water	13·28	12·00
Nitrogenous matter; albuminous compounds	26·34	20·62
Fat	5·82	6·36
Non-nitrogenous extraction	19·92	35·42
Woody fibre	28·12	20·36
Ash	6·52	5·64

"The ash of the kapok seed," we are told "contains 28·5 % of phosphoric acid, and 24·6 % of potash; it ought, therefore, to be of value as a manure."

The great partiality which rats and mice have for the seed (destroying pillows and mattresses, as they do, to get at the few seed that may have been left in the floss in cleaning) would seem to indicate the possibility of utilizing it as a stock food, at any rate in the rural districts, for feeding, ploughing and draught cattle.

As regards the floss we quote as follows from the *Imperial Institute Journal*:—

Serious complaint is made in Australia and elsewhere of the quality of the kapok shipped from India. "Even at the low price of India kapok (about 3d. per lb.) it is found better to pay 8½d. or more per lb., for kapok grown in Java. The former is frequently received in such a filthy condition as to be almost unsaleable." The hydrualic or steam-press packing of kapok tends to destroy that peculiar elasticity to which it owes its value. In addition, the packing tends to express a dark-coloured oil from the seeds left attached to the fibre, and hence a noticeable difference in colour between the Indian and the beautifully white Java products.

At Java the trade has assumed a uniform practice. No unclean stuff is shipped, but the different grades of cleaning denote standards of quality; the first, "extra cleaned," is the first picking of the crop, and is cleaned by machinery; the second, denoted as "best cleaned picked," being all hand-picked and free from seeds, except an odd one here and there; the third, is simply designated "cleaned." It contains a few seeds, together with the "slubs," or little knotty curly lumps, which are cast aside from the higher grades. Packing is all done in straw mats, and the floss is never tightly pressed.

The silk-cotton tree also grows in the West Indies, but for all practical purposes it is counted of little value. Considerable difficulty was at first experienced in the importation of silk-cotton, owing to its great bulk and the heavy cost of transport, but this has been overcome by a silk-cotton press constructed by Stork & Company, at Henglo.

In the annual report of the Director of the Botanical Department, Jamaica, 1884, the following remarks occur:—

"It now only remains for some enterprising firm to initiate the collecting of silk cotton in Jamaica, and to ship it in well-packed bales for the European market. If each cotton tree yilelded at the rate of about 100 lb. weight of clean floss, there might be exported from Jamaica every year

about 3,000 bales of silk-cotton of the value of £9,000."

"In Ceylon kapok is collected throughout the villages of the interior. The season commences in May, and one crop is obtained each year; the tree reaches maturity about the fifth year."

Australia receives large shipments of kapok both from India and Java, but it is difficult to obtain reliable statistics concerning the trade. It is entered at the local Customs under all manner of names, such as "vegetable fibre," "vegetable wool," "silk-cotton," "tree cotton," "raw cotton," and "small cotton."

So much attention is kapok receving in the East Indies, that the cultivation of the trees is even said to be ousting coffee in the province of Bu ma. Kapok has not been received in England on a very large scale; 100 bales a month are sent from India and Ceylon (1 bale = 200 lb. Ceylon, 400 lb. Indian), and the price varies from 2½d. to 4d. per lb.

We recall a letter addressed by Messrs. Thirkell & Co., dated London, 24th May, 1895, to the *Ceylon Observer*, in which that firm stated that "Kapok is wanted in fairly clean condition at 4d. per lb., and that a demand seems to be springing up for the silky floss of *Calatropis gigantea*—Mudar, or, as it known by the Sinhalese, Wara.

We note that the *Indian Forester* in taking over the article on kapok states that "kapok" is a Dutch name, whereas the word is undoubtedly of Malayan origin.

THE VITALITY AND DISSEMINATION OF SEEDS.

This is a subject upon which Mr. W. W. Glenny of Barking, Essex, contributes an interesting paper to the last volume of the Journal of the Royal Agricultural Society, England; a subject which he rightly terms a comprehensive one, but of great charm and value to the botanist, the horticulturist, the farmer, and even the general observer. The paper referred to is comparatively exhaustive, and we can therefore touch upon its most interesting points.

It is a common experience that ground disturbed below the average depth of cultivation, where fresh soil is brought to the surface soon becomes covered with varied and promiscuous vegetation. Plants unknown in the immediate locality greet the eye, and curiosity is aroused by the appearance of these strange visitants. Various theories are rife to account for the presence of snch additions to the flora of the immediate district. Where do these abnormal specimens spring from? Prof. Balfour says that seeds, when buried deep in the soil, lie dormant for a long time, and only germinate when the air is admitted by the process of subsoil ploughing or other agricultural operations. As instances he mentions the springing up of white clover and other plants which had previously not been seen in the locality, when land is turned up for the first time, and refers to the growth of strange plants after the great fire of London, a phenomenon similar to that which follows the burning of forests and draining of marshes.

Mr. Dureau de Mallé enunciated a distinct and unique theory regarding this question. He calls it alternative succession, and held that, as good husbandmen provide for a rotation of crops, in like manner nature arranges that indigenous species follow each other of their own accord. He cited many instances of one kind of growth, when cut or burnt down, being followed by a totally different form of vegetation. Similarly Herne says that straws berries grow in great quantity where fire has passed over a country, and Du. Petil Thomas that whenever forests were destroyed in the Isle of France, the soil was instantly covered with alien species indigenous to Madagascar, while Buck, Mackenzie, Davies, and Darwin and others mention many strange cases which we need not quote here, in proof of the occurrence of what may be called a natural system of rotation of crops. Mr. Holt White asserts that the application of certain substances will cause seeds to gemmiate that would otherwi e lie dormant. Lime, he says, will produce white clover in some soils; furze if sown on a newly-made bank will rarely grow, but put a little gritty sand on the seed and it will certainly vegetate. In most of the Essex marshes, whenever a new ditch is dug, brown mustard will spring up, although it has not been seen before in the memory of man. Of Camomile it is said that it has been observed to spring up on the site of habitations, sometimes marking precisely the ground plan of the building. Miller records the springing up of the fumitory plant in a spot where the seeds had lain dormant for fourteen years.

All this, though not absolutely supporting M. de la Malle's theory teaches that seeds of certain plants will remain uninjured in the soil for an indefinite time, provided the conditions are such as to hinder germination.

Materials such as sweepings from warehouses, docks, cowhouses and stables, manure and dust from ships coming from foreign lands, pulp from jam factories, are some of the sources whence strange specimens arrive. Here are a few instances: the troops summoned from Algeria to France in 1870, disseminated by fodder and otherwise a number of African and southern species which excited wonder. Many foreign and colonial plants are seen for a season where the sweepings of the warehouses are deposited near London. It is amusing to contemplate a field of oranges in Essex, yet where the pulp from Keiller's Marmalade factory was distributed over the land with manure, thousands of young orange plants were noticed.

Wind, water and animals are also instrumental in disseminating plants; many seeds and fruits with winged and feathery appendages are easily wafted about, others are carried by rivers and streams, and some can be transported by the ocean current to a great distance with their germinating power unimpaired.

Seed-eating birds are, as a rule, not the seed-planters; seeds which convey nourishment are eaten, and in the process are ground and destroyed; seeds which are imbedded in nourishment are swallowed and survive. In has been discovered that American crows can take in and retain for some

time and finally disgorge at will anything distasteful or injurious. Hence, having swallowed berries and assimilated the pulpy part, they can eject by the mouth clean and polished seeds. Some seeds may also through the alimentary canal of the carrier travel far away into other provinces, countries or continents. Many birds go a long way for their daily food, whilst migrants cross whole kingdoms at recurrent seasons. A great number of birds traverse a considerable distance in a minute; they are thus able to carry into foreign countries in a short time the plants or vegetables on which they feed.

Sig. Pistoni of Messina, a patient observer, gives instances of birds disseminating the bulbs of a species of *oxalis*, bringing over two varieties of oak into Sicily and Sardinia and *Acacias* from Massowah and Australia. In Sicily, where quails abound, the plan is to open the cup of birds directly they are killed, to obtain the varied seeds therein. These seeds are sown in pots, and strange and rare plants are often found.

We shall conclude our notice of this interesting paper in our next issue.

ARROWROOT AND THE CANNAS.

We are indebted for the facts in this article to a paper on the *Canna* which is published in the September number of the *Queensland Agricultural Journal.* We here deal mainly with the economic value of the *Cannas*, but the paper referred to should prove most interesting and instructive reading to gardeners.

Arrowroot is the product of species of *Maranta* and *Canna.*

The name *Canna* is said to be derived from an old Carib name of the plant; *Maranta* from Bartholommeo Maranta, a physician of Venosa, who died in 1559. It was bestowed in his honour by the botanist Plumier.

Maranta aurundinaceæ, and probably one or two other species, yield that which is known as West Indian or Bermuda arrowroot. The name arrowroot is usually supposed to be derived from the fact that the Indians used the bruised rhizomes as an antidotal application to the wounds from poisoned arrows, but some authorities contend that the word comes from "Aru-Aru," the name which the Aruac Indians of South America give to the farina obtained for the manioc. Tous-les-mois, another form of arrowroot, is produced in St. Kitt's and other West India Islands from the underground stems of *Canna edulis*, and possibly other species. The name Tous-les-mois is said to be derived from Touloula, which is a Carib designation for *Canna.* It is also said to be given in consequence of the plant flowering the whole year round. This is the variety of arrowroot produced in Queensland. It is in all respects as valuable and nutritious as the Maranta or West Indian arrowroot, being only a little darker in colour. Under the microscope it is very distinctive in character. The granules are very large, exceeding in size those of all other known starches. Maranta arrowroot, it should be mentioned, is the only kind recognised under the Food and Drugs Act of Great Britain, and last year a dealer at Ashford, in Kent, was prosecuted for having sold Queensland arrowroot instead. It is interesting to find, however, that the case was dismissed on the ground that there was no intention to defraud, but the fact was pretty well established that Queensland arrowroot could only be sold in England under the distinctive name of Queensland arrowroot.

Efforts have been made to induce the cultivation of the Maranta plant instead of the *Canna edulis* for the production of arrowroot in Queensland. It is contended, however, that as a food product the Tous-les-mois is equal to or more valuable than the others, and the yield of the farina is very much greater per acre. Again, the Maranta roots much deeper than the *Canna edulis*, consequently requiring deeper and more expensive cultivation. For the same reason it is much more expensive to harvest.

From 1830 to 1860 attention was given to the *Cannas* chiefly as foliage plants, and cultivation and hybridisation was carried on with this purpose in view.

Since 1863 the value of the *Cannas* as flowering plants began to be recognised, and attention was directed to the raising of varieties of dwarfer growth, with brighter coloured flowers broader in the petal (or, correctly speaking, staminodia), thicker in texture, on finer and more massive spikes. The grower who has made the greatest advances in the production of the beautiful-flowered *Cannas* is M. Crozy, of Lyons, so thoroughly is he identified with our garden *Cannas* that he is said to be known in his own neighbourhood as "Papa Canna," a name given to one of his latest varieties.

The hard black round seeds of the Cannas are popularly known as Indian Shot, and they are reported to have been frequently used for shot in the West Indies. They have also been used as a substitute for coffee.

VETERINARY WORK IN CEYLON.

In my report for last year I suggested the formation of a staff of veterinary assistants stationed in various parts of the Island. In September last this was sanctioned by Government, and appointments were offered to Mr. W. A. de Silva and Mr. Hoole, Graduates of the Bombay Veterinary College, to be respectively stationed in the Northern and North-Central Provinces. Unfortunately Mr. Silva, from whom I felt certain of great assistance in the work, did not see his way to accept the appointment. Consequently, I was left with one assistant, Mr. Hoole, who is stationed at Anuradhapura.

Early in September Mr. Hoole took up his residence at Anuradhapura, and has been travelling most of the time since, as detailed in his reports furnished to Government. His work will certainly be difficult at first and disheartening, and must advance slowly step by step. He mentions that village headmen are not strict enough, and in the majority of cases do not take sufficient interest when an outbreak occurs, or even see that his instructions are carried out.

In some outbreaks, especially in the Western Province, when careful measures have been taken by headmen, disease has not spread further than the village in which it broke out.

The owners in most cases, especially in the Northern and North-Central Provinces, are poor and ignorant, and, what is worse, superstitious. A great many believe that disease is due to the displeasure of supernatural beings, and if they arrest the disease they will fall sick themselves. Others prefer to commit their cattle to the care of the gods sooner than carry out any sanitary or suppressive measures they do not know about or understand. Again, a large number of animals are semi-wild, and it is next to impossible to administer medicines or to do anything with them. These are a few of the difficulties encountered in dealing with outbreaks of disease.

It is very troublesome and expensive work in Europe to stamp out contagious and infectious diseases, where fences exist, the country is open, with a large police force and thoroughly organized Veterinary and Agricultural Departments and other things in favour of the work. In Ceylon, from the wooded nature of the country (hiding wild and domesticated animals dead of disease), seasons, impure water and scanty food, want of shelter, religious and superstitious beliefs, and indifference, the work is rendered extremely difficult. The headmen and people must first be made to understand the why and wherefore of such strict measures necessarily enforced, and that it is to their own advantage to try and prevent disease amongst their cattle; then I think they will take every precaution against disease. The Assistant Veterinary Surgeon's work must therefore at the outset be largely coupled with instruction upon management and hygienic and sanitary points.

A great deal rests with the headman of each village. If he would take precautions whenever a case of disease occurred, a large number of deaths might be prevented. As soon as a case comes under his notice of suspected cattle plague, he should at once remove it from all others and prevent any communication with it except by the person who is looking after it, or even kill it and bury it,—the deeper the better,—or burn it.

I have no doubt many cases are reported as murrain that are not murrain at all. In many cases reported the disease appears to be confined to buffaloes, black cattle escaping to a great extent.

True murrain does not pick and choose its victims, but spreads amongst all in contact. The buffaloes lay about in tanks and pass both dung and urine freely into the water. During the dry season, when the water becomes low, it is highly charged with these impurities, and from this alone there are many deaths from severe diarrhœa. Usually in dry seasons there is also great scarcity of food. The animals become weak and emaciated. Then when the rain comes and the young grass appears a great many are not able to stand the change, and die. It would be a good thing if some of the grass, &c., was dried in the sun and made into hay during the time when it is in plenty, and saved up for the cattle to eat during the dry season.

When cattle are sick they require very careful nursing. They lose appetite and will not eat unless coaxed to do so by giving small quantities often of different foods. They also require gruel or conjee of some kind until they regain their appetite. If they are not well attended to, the chances of recovery are minimized, and they have no strength left to support them during convalescence. It is with the greatest difficulty that owners can be persuaded to do this. They say they cannot afford it, and it is quite true. In some places I visited they were hardly able to get conjee themselves. I am quite sure that if the cattle were well looked after, and given good food and water, there would be a great deal less disease reported.

In my report for last year I suggested that animals imported into the Island should be properly inspected before being allowed to land, in order to prevent as far as possible the introduction of any diseased animal or animals that have been in contact with diseased ones.

The number imported is considerable, as the following figures will indicate:—

		1895.	1896.
Colombo	Cattle ...	11,276	8,983
	Horses ...	—	832
	Sheep and Goats	—	68,201
	Deer ...	—	2
Mannar: Vankalai	Cattle ...	4,764	4,934
	Sheep and Goats	2,317	3,684
	Horses ...	72	77
Pesalai	Cattle ...	801	1,358
	Sheep and Goats	8,613	4,096
	Horses ...	18	26

I am now making arrangements to inspect the cattle daily.

The "tick plague," so prevalent in Australia, has been noticed in horses imported into India. Most of the imported cattle come from India, where, as is well known, there are frequent outbreaks of "rinderpest." The South African experience should be a warning to countries into which cattle are imported. It has been reported the outbreak of rinderpest there was due to importation of cattle from Aden.

Several cases of rabies have been reported by the Police. On March 28th a rabid dog bit another dog and a goat on the ear. The dogs were destroyed. The policeman cut off the goat's ear at once and it apparently suffered no ill-effects from the bite. On April 7th another case was reported from Bambalapitiya, and a woman was bitten and placed under native treatment. On May 25th another case occurred, and the owner of the dog and two more dogs were bitten. The dogs were all destroyed. Probably there are many more cases than are reported. I saw two horses during the year that had been bitten on the nose by dogs suffering from rabies. One died showing well-marked symptoms of rabies, the other suffered no ill-effects.

A great many more of the unfortunate dogs seen about the town should be seized and destroyed. In nearly every street dogs are seen lying about covered with mange, whose life must be far from happy. Each valuable dog should be provided with a small collar, with a number upon it corresponding to the owner's name and address registered at the police station; the remainder should be seized and, if not soon claimed, destroyed.

I should like very much to see something done to prevent the branding of cattle with hot irons to such a great extent as is now practised. It is totally unnecessary, and nothing can be put forward to support it. Nobody can have any objection to branding a *small mark of ownership* upon the cattle, but the letters and name might be as small as possible instead of nearly covering the sides of the animal. The most unnecessary and cruel practice is covering the animal with the fantastic figures so commonly seen, especially on draught bulls. I have no doubt it is done with the belief that it improves, the health and condition of the animals, and I think a little persuasion from district officers and headmen would lessen the practice considerably.—*Colonial Veterinary Surgeon's Report for 1896.*

INVESTIGATIONS INTO RINDERPEST.

Dr. Kohlstock has forwarded an exhaustive report to the Secretary for Agriculture at the Cape, on the results obtained from the experiments which Dr. Koch had directed him to carry out in completion of his work. From this report, which we are unable to take over bodily, we make the following extracts:—

To prove how long immunisation produced by the inoculation of 100 cc. of serum obtained from a salted animal lasted, three beasts were injected. No. 1 received after 24 hours a fatal dose of rinderpest blood. No. 2 was heated similarly after 10 days. No. 3 after 20 days.

Nos. 1 and 2 were immune after a slight attack of rinderpest, and No. 3 died.

This tends to show that immunisation produced by serum is of short duration, not longer than 10 to 20 days.

The serum used in this experiment was of weak immunising power, and it would be well to repeat this with a more potent sample.

Experiments undertaken to ascertain the best period at which to bleed the animals for immunising serum have given the following results:—

Serum taken from a healthy full-grown animal after mild rinderpest, which had been inoculated with 20 cc. of virulent blood without effect to prove its immunity, has given the strongest serum. Twenty-four cattle were used for this experiment. These have been rendered immune either by inoculation with gall or serum.

The best serum was given by an animal which was first injected with gall and then was injected by rinderpest blood, after four days, and before immunity was established, so that it suffered from a mild attack of rinderpest.

This is the method recommended by Dr. Koch, and which I have established by further experiments.

I think that these also should be repeated.

The serum is strongest when taken between the 10th and 20th day after the inoculation of 20 cc. of virulent blood, say the 15th day.

To raise the immunising power of the animal it would be advisable to inject higher doses than 20 cc. This has already been done, but the experiments are not yet concluded.

To ascertain if the mixture of one per cent. of virulent blood with immunising serum was capable of spreading the disease, I have rubbed the mixture in the nostrils, and introduced it into the nasal passages.

The animal did not become ill, but died after it was inoculated with virulent blood.

In this experiment only a weak serum was used, as this was the more likely to allow the animal to become infected. I wish the experiment to be repeated with a stronger serum, to see if it would be rendered immune.

With rinderpest gall the following experiments have been made:—

I may mention that previous to use all galls were tested microscopically and bacteriologically, since animals which died six or seven days after the injection of good gall had been previously infected by the accidents to which I referred at the beginning of this report.

Those which became immune were tested first with 0·2 cc. and then with 10 cc., and last with 20 cc. of virulent blood, and were unaffected thereby.

Animals which were injected either with brownish-green gall, containing the Simpson bacillus in pure culture, or gall of a brown colour, containing both bacteria and streptococci, became immune without the occurrence of any accidents such as abscesses, etc.

Thick green gall, free from smell and organisms, has often been taken from dead cattle. On one occasion I rendered an animal immune with such a fluid, which had previously been mixed with normal salt solution to render it thin enough to go through the needle by injecting 20 cc. of the mixture.

This is the only experiment of the kind yet made. The yellow-brown gall, with yellow flakes free from smell, taken from an animal which had been suffering 3 weeks from rinderpest, and died of the secondary infection, caused sickness in an animal on the 9th day and death on the 15th day. The gall if it did not cause the death of the animal certainly failed to render it immune.

It has frequently been stated that gall used while still warm is capable of infecting. I have injected an animal with 10 cc. of fresh warm brown gall which gave a yellow froth. The beast became immune and resisted the inoculation first with ·2 cc. and then with 20 cc. of virulent blood.

To ascertain the period at which gall should be taken to give highest protection, a series of animals were injected and killed on the 5th, 6th, and 7th days of fever. Those killed on the 6th day gave the best results. Ten animals killed on the 6th day gave 750, 350, 470, 500 and 500 cc., total 2,570 of good dark green clear gall, without smell or organism, the others were useless. Thus 10 animals would have served to immunise 257 head of full-grown stock.

Gall kept in the ice box does not lose its power for some time; cattle have been immunised with gall kept 14 days in this way.

Several other experiments with a view to discussing methods of preserving gall are in progress, as it may often be necessary to send galls some distance.

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Two calves born on the station proved to be immune; the first was produced by a cow which had been treated with serum. The young beast when one month old received with impunity sufficient rinderpest blood to kill a full-grown animal sixteen days after it was inoculated a second time with enough blood to kill 100, and then with enough blood to kill 1,000 oxen, it is strong and healthy notwithstanding.

The second or weakly animal similarly proved to be perfectly immune.

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Upon the famous Talpan and Klippiespan, the 217 animals inoculated by Dr. Koch, Dr. Turner and myself are in perfect health, and the majority after 59 days and the rest after 39. I may remark that neither of these animals developed an abscess.

To obtain a clear proof how long the immunity lasts, I have inoculated with rinderpest blood sufficient to kill 100 animals on the farm Susanna, five of the beasts previously operated upon by Dr. Koch three months ago.

Two of these animals had been tested in this way by Dr. Koch himself, the other three had not been touched since the first inoculation with gall. All five animals are in good health, with normal temperatures after the lapse of eight days.

This shows that this immunity produced by gall continues at least three months.

My experiences gained on farms on which I have infected the cattle shows me that infection can easily be introduced into the herd by the very Kaffirs employed to cast the animals for the purpose of the operation.

I can also see, too, that young calves and animals in poor condition are those most susceptible to the infection.

As regards the idea that rinderpest gall is capable of conveying the disease, I can assert that Dr. Koch used many galls of various kinds, and until the station became thoroughly infected failed to produce the disease in any animal.

At Klippiespan and Talpan wherever Dr. Koch, Dr. Turner and myself made arrangements which were strictly carried out no animals died from the injection, and I can only be responsible for inoculation preformed under such conditions.

My recent experiences convince me that gall of a dark green colour clear, without smell, and which when shaken gives a white froth with greenish tinge, never gives rinderpest but confers immunity, and only such galls must be used for the purpose.

Even these should be examined microscopicially and bacteriologically to prove them free from septic organisms.

I repeat that gall in sterilised air-tight bottles will preserve its power on ice for the space of at least fourteen days.

This has been tested. Therefore the gall is a practically useful immunising agent.

In fact gall properly chosen and used with all scientific precautions cannot produce the disease.

I am sorry that it is impossible for me to experiment upon an undoubtedly clean herd, and can only recommend that this most urgently necessary experiment should be carried out without delay with 6 different galls collected on the 6th day as previously recommended, and tried upon 60 animals on a farm where rinderpest has never been and which is far away from any centre of infection.

The temperatures should be taken 4 days previous to the inoculation, and if they are normal the experiment should be made on the 5th day, and each lot of 10 animals inoculated with a different gall, and marked.

The persons casting the cattle must not have been engaged on infected farms.

The outside of the bottles containing the gall must be well disinfected; the cattle must be watched so that they can never incur any danger of infection until immu-nity has set in.

So far as I know such an experiment has never been tried before.

Should only one of these animals suffer from rinderpest, it then can be proved that good gall can convey the disease, a statement I shall dispute until thus tested.

If this last recommendation cannot be carried out, I advise that before beginning the infection the cattle should be divided into 3 lots.

The first lot should consist of strong full grown cattle.

The second sucking calves with their mothers.

The third lot weaned calves and old weak cows.

The temperatures should be taken, all suspicious cases isolated, and they should be inoculated with rinderpest gall on the 5th day.

This would determine whether the physical condition of the animal had any effect on the process of immunisation.

As regards the injection itself I would say that the cattle of lots 1 and 2 should all be injected with 10 cc. of gall except the calves, the latter should be inoculated 8 days later.

Cows heavy with calf should not be inoculated unless the operation can be performed without causing them accidental injury by casting, &c. Unless this can be assured the inoculation had better be postponed until after calving.

The third lot must be inoculated 8 days after lots 1 and 2, and the 5th and 7th days after inoculation the temperature should be taken and all those with fever must be isolated.

The 10th day after inoculation 2% should be taken out of each lot and infected with rinderpest blood.

Those full grown should receive 0·2 cc., calves 0·002cc., the latter quantity is twice the lethal dose.

If the control animals are infected it will be proof that the gall has failed to immunise and the operation must be repeated.

I am certain that if gall inoculation is made in the manner indicated, rinderpest will soon be a thing of the past in South Africa.

CEYLON FISH.

Dr. Watt, in his Dictionary of Economic Products, gives an exhaustive list of Indian fishes of economic value, among which occur the following which are well-known and commonly eaten in Ceylon:—

Cybium commersonii—Seer or Seir fish. The species of this genus are said to be amongst the most delicate of all marine fishes when of the proper size; if under a foot in length they are said to be dry, from 1½ to 2½ feet they are most excellent, while above this they become coarse. Other species of the same genus and also known as "Seer" are *C. guttatum* and *C. lineolatum*.

Cynoglossus lingua—the Sole. Highly esteemed for the table, and considered to be light, nutritious, delicate, and one of the fish that may be safely given to invalids.

Engraulis indicus—White Bait—extensively employed as food, cooked in the same way as white bait.

Etroplus maculatus—the Sinhalese "Rallia," and *E. surathensis*—"Corallia."

Harpodon nehereus—the Bombay Duck. Highly esteemed as food whether fresh or salted, and in the latter form extensively employed as a relish with curries and known as "Bombay Duck."

Lates calcarifer—the "cock-up," or "nair fish" (Koduwa). Good eating when obtained from the vicinity of large rivers; salts well and prepared as "tamarind fish."

Anabas scandens—the climbing fish (Kaviya). This fish is most remarkable for its powers of living in the air and can travel a long distance on land. It is esteemed as a nourishing food.

Saccobranchus fossilis—the scorpion fish, a freshwater fish of Ceylon, attaining one foot or more in length. It is considered very wholesome and invigorating by the natives.

Rynchobdella aculeata—the sand eel (theluja). Found in brackish waters within tidal influence. It is excellent as food though objected to by some owing to its resemblance to a snake but it is less disgusting in appearance than the muræna; by Europeans this is considered the best of the eel-kind.

Rynchobatus anchlostomus—the Mudskate. The skin of this, as of other skates, is valued; also the fins and livers.

Pristis cuspidatus—the Saw Fish. Attains up to 20 feet. The flesh is highly esteemed, the fins and skins and livers are all valuable (Tamil, vela min).

Ophiocephalus striatus—the walking fish or murrel (Lulla). A freshwater fish which with *O. maralius* (another spieces) affords excellent sport and good food. Very suitable for stocking tanks.

Mugil (various species)—Mullet. Considered excellent eating, but perhaps rather too fat and rich for delicate stomachs. The spawn salted and dried forms a sort of "cavier" called by the Italians "Boborago.

Mastacembelus armatus—the spined or thorn-backed eel. Found in brackish waters. Attains two feet or more and is good eating, especially curried or fired.

Lutjanus argentimaculatus—the red-rock cod, found throughout the seas of India. Attains upwards of two feet in length and is good eating. The other species of this genus though eaten are rather insipid. They are extensively salted and dried in some localities, and are also known as Singara and Senan Karawa.

Sillago sihama—whiting; supposed to have special milk-forming properties like shark's flesh

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FRUIT CULTURE.

(*Continued.*)

No great reflection will be needed to show that the proper selection of a locality for an orchard may very materially diminish the amount of labour and expense required to produce the mechanical condition so much to be desired. Unless absolutely confined to a definite acreage without a chance of skilled selection, no person would attempt to establish an orchard on a compact clay, or in a place where the level of the ground relatively to other properties rendered it the recipient of surplus water from above. It is essential even when a man chooses his ground and receives no surplus water from his neighbours, that there be the freest possible outlet for his own drainage, whether of rain or irrigation water. The most favoured localities for orchard should be on a gentle slope to ensure the best conditions as regards water, so as to fulfil the proverbial saying "soon on, soon off," which concentrates in itself a good deal of gardening wisdom. The water-level should never reach the average depth of the roots.

By far the most thorough and satisfactory method of inducing the desirable spongy condition of the soil, is the simple yet expensive and laborious operation of trenching. Much has been done by the implement-maker to effectively break up raw earth and let vital air into it; but for the most part these mechanical appliances, however successfully they deal with such tilth as may suit cereals or even root crops, do not go deep enough for the best orchard preparation, except at an expense for steam-gear which brings their work pretty close to the cost of the much more effective hand labour of trenching. The great thing to be wished for in this regard is that the fruit-grower shall deal as handsomely by his orchard as he has, through long custom and prescription, habitually dealt by his vineyard. The depth to which the trenching should penetrate depends greatly upon the nature of the soil. It must be remembered that if in clay-land it penetrates only two feet, the drainage of the rain-water and much of the irrigation-water in spring and summer will creep along that two-feet level. The deeper therefore, under such circumstances, the cultivator pushes such trenching, by so much does he lower the water-table, and gives his trees immunity against water-logging of their roots. Should the soil be sandy and naturally open, rapidly relieving itself of surplus water by percolation downwards as well as along its natural slope, the necessity for deep trenching is not so absolute, and limits itself more particularly to the aëration of the soil.

Under any circumstances a sufficient number of drains should be taken down the main slope in every part of their course, and should descend into the subsoil a little lower than the depth to which the trenching has been regulated.

An excellent system of drainage consists of what are known as French drains. These drains are formed of a V-shaped trench cut down into the subsoil straight along the main slope of the land, care being taken to leave the bottom of the trench unbroken and in an exact plane, since if its level varies in the least the water will not get a free outflow and pools will form in its course so that much of the value of the drain will be lost.

The cutting of really good drains without flaws is a skilled operation. Drains that have been patched up by repairs, that is by ramming materials over parts that have been cut too deep will always be weak soft spots where the water will tend to hang. It is therefore best to give work of this nature to skilled workmen, seeing that the work will be better and more economical, because more rapidly executed. The bottom of the trench in these drains will as indicated above be narrower in width than the top. After cutting the trenches, it is usual to fill the channel with rounded river pebbles or similar rubble to a depth of 9 in. or a little more. Angular fragments should if possible be avoided as they do not give such large interstices and are more apt to cause clogging and stoppage. Upon the top of the pebble bed it is customary to put a layer of brushwood well battened down. The object of compressing the brushwood is to work the layer together and prevent filling from soil dropping down to the pebble-bed. When cultivators recognise that good drains are so much capital which constitutes a profitable outlay, they will use something more lasting in the place of

brushwood, which must ultimately, after a few seasons, moulder away and help to fill the openiugs in the pebble layer. The best plau would be to procure old galvanised sheeting and cut it into strips about a foot and make them serve as drain roofing; a coat of coal tar or gas tar on both sides will double the length of service of the iron sheeting. This plan will treble or quardrangle the term of usefulness of an ordinary Freuch drain.

(*To be continued.*)

GENERAL ITEMS.

Sir W. Wedderburn in his series of papers on the Agricultural Problem in Iudia thus refers to the subject of agricultural banks:—Now the recognised method of supplying working capital to peasant proprietors is by the establishment of agricultural banks. In Germany alone there are some 2,000 such banks doing a business amounting to something like 150 millions sterling with immense benefit to the rural populatiou. Every other country in Europe has followed the example of Germany: the Autocrat of All the Russias started such banks with liberal support; and even the unspeakable Turk has made some movements in the same direction. In India alone nothing has been done. The Autocrat of the India Office would neither move himself, nor allow others to move.

Maize growers will be interested to learn that at length a discovery has been made that may turn out of incalculable value to growers of the crop. A well-known ship-builder in Philadelphia (Mr. Cramp) has announced that a chemist under his patrouage has discovered that, through a certain process, the stalks of maize will furnish material for a large variety of articles, notably paper, matting, smokeless powder, sugar, etc. Hitherto maize stalks have been of little or no value, except, of course, when a crop has been grown for green food. By this discovery, however, it is alleged that the stalks will be worth at least £1 per acre. In fact, the enormous area of land in America devoted to maize will make this by-product—the stalks—more valuable than cotton seed, at one time such a nuisance, but now of immense value every year.

A certain person calling himself Kwassie Musean writes to the *Locomotief* from Baujoemas stating that he has discovered a leaf of a certain tree, which is a native to all part of Java, as a remedy against whiteauts. By placing one or more of the leaves in the haunts of the whiteants one could get rid of them altogether. He is prepared to make known the remedy on payment of a sum of 3,000f.

Veterinary work would seem to be making rapid progress in Bengal. We read in the report for the year 1896-97 that at the Hospital in Calcutta "479 animals were treated as in-patients and 248 as out-patients, or 729 in all. The total shows a decrease of 46 cases, but the number of iu-patients shows au increase of 42—a fact which no doubt indicates that confidence in the institution is growing among owners. The Superintendent proposes to modify the scale of fees with a view to securing a large number of patients. An ambulance has recently been provided to convey sick animals to the hospital." There are also dispensaries at other centres, supported by local subscriptions with a grant from the District Board or by the Municipality.

Some-time ago we referred to the variation of the Indiau maund. A correspondent to the *Indian Agriculturist* now complaining of the anomalies of the system of Weights and Measures refers specially to the seer, and says: "Within a circuit of twenty miles from the place from which I am writing (Barharwar) there are no fewer than four standards for the seer—112, 92, 80 and 75 tolas respectively. The calculation of these is most confusing, and at this time of famine we can never be quite sure as to what the real price of rice is. A letter came to me saying that rice was selling at 6 seers for the rupee. I found on enquiry that it was the large seer of 112 tolas which would mean 8½ usual seers." The correspondent suggests that the Diamond Jubilee year be remembered by the introduction of the metric system throughout Her Majesty's Dominious.

The outer coat of the seed of the *Cannas* is as is well-known very hard, and without help the germ is seldom able to break through. It requires heat and moisture, aud the best way, says a well-knowu grower, is to soak the seed in very hot water for about twelve hours before planting. Let the seed bed be exposed as much as possible to sun aud water frequently. Even then only few seed germinate, aud that too most irregularly. Some authorities recommend filing through the outer coat, others the use of boiling water.